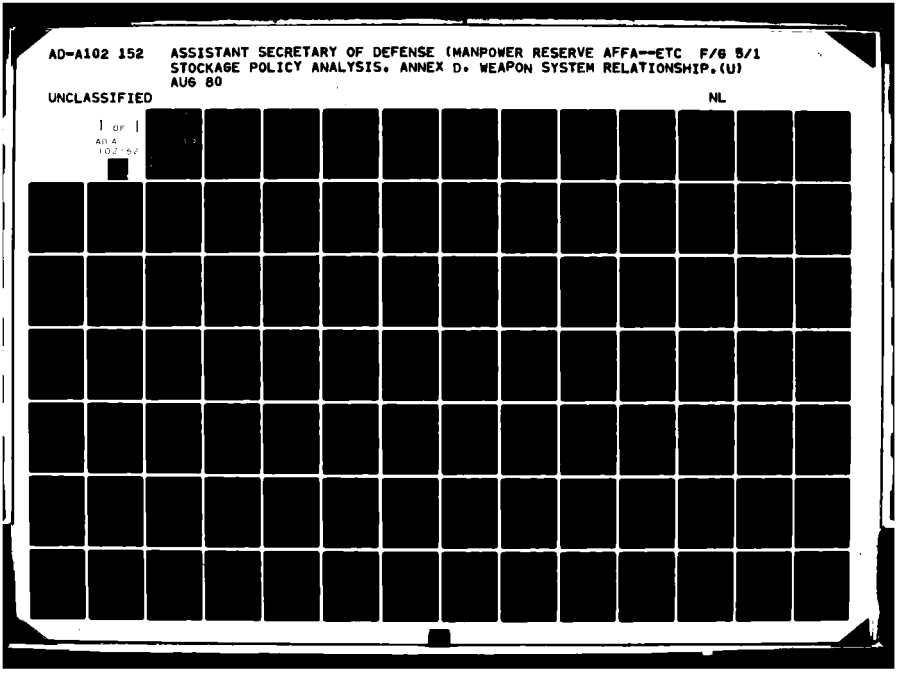
AD-A102 152 ASSISTANT SECRETARY OF DEFENSE (MANPOWER RESERVE AFFA--ETC F/G 5/1
STOCKAGE POLICY ANALYSIS. ANNEX D. WEAPON SYSTEM RELATIONSHIP.(U)
AUG 80

UNCLASSIFIED NL

1 OF 1
AD A
102152



(1) LEVEL III

A102151

AD A102152

(6) STOCKAGE POLICY ANALYSIS.

ANNEX D.

WEAPON SYSTEM RELATIONSHIP.

DTIC
ELECTE
JUL 29 1981
S D
B

DTIC FILE COPY

(11) 31 Aug 80

AUGUST 31, 1980

(12) 96

410390

81 7 28 00

STOCKAGE POLICY ANALYSIS

ANNEX D

WEAPON SYSTEM RELATIONSHIP

AUGUST 31, 1980

TABLE OF CONTENTS

1.0 PROGRAM DATA USAGE AND APPLICATION DATA

PROGRAM DATA USAGE
FOR
WEAPON SYSTEMS PHASE-IN/PHASE-OUT

Introduction

The purpose of this report is to identify current policies/procedures used by DoD Components to recognize the impact on requirements determination during the phase-in/phase-out period. Documentation of each components system revealed that, while all components use program type data during phase-in, there are two methods used by the Components to comprehend changing requirements during phase-out. These are: use of program data such as flying hours, equipment population, troop strength, activity levels, etc., and single or double exponential smoothing techniques called trending.

Inherent in any system's capability to apply program data is the ability of that system to identify the application of any given item of supply to a weapon system. Therefore, before the usage of program data could be considered, a system capability to identify item application had to be documented.

Application Capabilities

The Army, Navy and Air Force have master data records for all National Stock Numbers that contain line item characteristics data including application information.

The Navy also has automated data system files which contain the same application data as the master data file, but is keyed by application and provides a break-down from unit (ship/activity) to major component/application to line item.

DLA does not have an application file per se. However the on line system identifies each item nominated by the military services as essential to support of selected Weapon Systems. Off line tape files identify these individual items to their specific weapon system application.

Program Data Usage

All DoD Components have a capability to employ program data in developing forecasted requirements. This capability is used in varying degrees by all DoD Components except the Defense Logistics Agency (DLA). A synopsis of the methods utilized by the components follows:

Army

Program data is used throughout the life of all items to include a system phase-out date beyond which no further requirements are forecasted. The Army is the only component to utilize the phase-out date for limiting forecasted requirements.

Air Force

Program data is used throughout the life of all investment items and for selected expense items when the projected program deviates by plus fifteen percent or minus ten percent from the past two year average. Those expense items not meeting the deviation criteria are projected by straight lining past demand.

Navy

Program data is used throughout the life of all aircraft investment items except ground support equipment (GSE). All other aircraft items except GSE use program data during the demand development period (normally two years), after which single exponential smoothing is used. Aircraft support equipment is initially procured on a program data base. However, the program relationship is not retained during a demand development period. Ship parts, in general, do not use program data during demand development and subsequent support periods, however, single exponential smoothing is applied.

DLA

Double exponential smoothing is applied to all items to forecast future demand. Although DLA has built the capability to use program data, this concept has not been tested in actual use. Efforts are underway to obtain necessary data for an initial test effort during Fiscal Year 1981 from the Army for the XM-1 Tank. When DLA tests its concept for use of program data, it plans to apply the program factors to the forecasts developed by the double exponential smoothing technique. This is the only component that will use program data in this manner.

Evaluation

Both the use of program data and trending will impact requirements determination during phase-out. It is the concensus of the Working Group that use of program data has a quicker reaction than trending, given that useful program data are available or can be developed.

SYSTEM CAPABILITY FOR WEAPON SYSTEMS PHASE-IN/PHASE-OUT

Introduction

When a weapon system is introduced to the supply system, all DoD Components generally use techniques to develop a computational base for the purpose of acquiring an adequate level of parts and components to support the new system in its initial and early years of deployment in accordance with provisions of DoD Instruction 4140.42. Therefore this paper will primarily address the consideration of the application of program data during phase-out.

Discussion

One of the primary considerations that must be made, when a system is to be phased out of the active forces inventory, is the planned future use of that system. In many instances assets phased out of active forces inventories are used to augment the reserves and national guard units as well as or offered for sale to friendly foreign governments with follow-on co-operative logistics support. In these instances component/ parts utilization continues and the managing DoD Component is required to maintain support. Further compounding the problems associated with phase-out is the extending leadtime for acquisition of required components; currently some components in the aviation industry requiring forgings are experiencing from 35 to 54 month leadtimes. These leadtimes coupled with the uncertainties of phase-out schedules, due to engineering/production problems associated with replacing systems necessitating changes/extention of the schedules, present horrendous problems to the supply system if it over reacts to initial phase-out planning.

Another factor that must be considered are those items that have multiple use within a DoD Component and/or between DoD Components to preclude degradation of operational readiness for systems remaining in

the force structure inventories that may use a part/component of a weapon system being phased-out.

The above discussion on problems associated with phase-out is equally applicable to weapon systems that experience a significant reduction within a relative short time span and then remain in the active forces inventory at a much lower level of activity than had previously been experienced. An example is the F-4 aircraft that experienced approximately a forty percent reduction in Air Force flying hour program over a two year period.

Current Practices

DoD Instruction 4140.42 requires the DoD Components to practice austerity when introducing new items into the inventory. This is especially true for high cost repairable components.

The austerity required and practiced in the introduction of these items, tends to minimize inventories at the time a system is phased-in.

Currently the DoD Components use various methods for consideration of decreasing programs which would include orderly phase-out of weapon systems. The two primary methods used are program data and trend analysis which are explained in the Components papers on System Capability for Weapon Systems Phase-In/Phase-Out. The Army utilizes program data throughout the life of the item to include a system phase-out date beyond which no further requirements are computed; the Air Force uses program data throughout the life for investment items and for expense items when the projected program deviates by plus fifteen percent or minus ten percent from the past two year average; the Navy utilizes program data throughout the life of aircraft investment components. All other aircraft items use program data during the demand development period (normally two years). From that point single exponential smoothing is used to forecast demand; ship parts in general do not use program data during demand development and subsequent support

period, however, single exponential smoothing is used. DLA utilizes a double exponential smoothing technique to comprehend fluctuation in demand patterns.

In addition to the procedural applications discussed above, many off-line actions are taken when a system is scheduled to be phased out. Examples of these actions are:

a. Querying customers for estimated decrease in requirements associated with reduction of weapon system assets.

b. Querying customers for estimates of assets available to be returned to the wholesale system. This data is then used in the development and execution of procurement/repair programs.

Conclusions

DoD Components are comprehending to varying degrees reduction in requirements computations and using off-line actions to minimize residual inventories remaining when an item has phased out of the system.

Program data is useful when a system is phased out or significantly phased down in a relatively short time span.

DoD Components need to improve management actions during phase-out or significant phase-down of weapon systems.

Policy Statement

The Components will identify significantly declining or total phase-out programs and develop service initiatives that will include as a minimum; actions to reduce requirements forecast, draw down unneeded peacetime assets and war reserve stocks, project accelerated returns, and modify repair requirements. Components will provide detailed information to DLA and other supporting Components that will enable them to initiate similar actions on items managed in support of significantly declining or phase-out programs.

SYSTEM CAPABILITY FOR WEAPON SYSTEMS
PHASE IN/PHASE OUT--ARMY

Program Data

Program data is recorded into a standard application in the Army's Commodity Command Standard System (CCSS) used by all Inventory Control Points. Data recorded in this file by end article application is as follows:

TYPE	SOURCE
1. End Item Density	Structure and Composite System (SACS File)
2. Hours of Operation	Conversion from SACS Files
3. Flying Hours	DCSOPS Flying Hour Program
4. Rounds Fired	DCSOPS Ammunition Consumption Program
5. Troop Population	SACS Files
6. Miles Traveled	Conversion from SACS Files
7. System phase out Date	Various

Files are normally updated annually unless directed by DA Staff due to extenuating circumstances.

Computation of Program Change Factors (PCF's) are then calculated by dividing average quarterly past program data (generally past 24 months) into future program data by quarter to develop a program change factor.

Examples of Program Change Factors (PCF's) are:

$$\text{Quarterly PCF} = \text{Future Quarterly Average Flying Hour Program} \div \left(\frac{\text{Base Period Flying Hour Program}}{\text{No. Qtrs in Base Period}}\right)$$

The same basic formula is used for all program elements (1 through 6) above by substituting each element in place of the Flying Hour Program

in the example. PCF's are applied to all items experiencing field demand.

Items that are used in Depot Maintenance Overhaul compute a Maintenance Factor (MF) as follows:

$$MF = \left(\frac{\text{Qty of part used}}{\text{No of items overhauled}}\right) \quad 100$$

Items having both field and Depot Maintenance application will have both factors.

The program data file will contain program data by type; for example, flying hours, rounds fired, miles traveled, etc., for specific customer areas by end article application. Customer area data may be further broken down to a type customer, country code and international logistics criteria level, if desired. Data content will reflect, when applicable, two base years and up to six forecast years. The data contained in the file will be used to compute program change factors for use in supply control studies. The file will also contain item phase-out data.

Demand Forecasting Using Program Data

Forecasted demands to support recurring field requirements are developed by computing an average quarterly past demand (AQD) over the same base period used for developing the program change factor and then multiplying that AQD by the program change factors developed above.

Forecasted requirements to support overhaul requirements are developed by multiplying the number of items to be overhauled expressed in hundreds of overhauls by the maintenance factor.

During phase in of a new weapon system, an engineering estimate of demands is initially used. During the demand development period, ac-

tual demand recorded is weighted against the engineering estimate as prescribed by DoD Instruction 4140.42.

When phasing out a weapon system, the declining population of the weapons sytem being supported automatically reduces the program change factor and the system phase-out date, included in the Program Data File, precludes the requirements system from projecting requirements beyond that date.

Trends

The Army does not utilize trend analysis for computing future expected demand. A report by the U. S. Army Inventory Research Office published in September 1975 concluded that the usage of program data was superior to trend analysis for forecasting demands.

Planned Improvements

The Army has experienced problems with field requisitions with the identification of requirements as recurring or non-recurring. New retail level computer programs being developed are addressing this area and will give the field a much better capability to provide this information to the wholesale system; which in turn will significantly enhance wholesale level demand forecasting.

SYSTEM CAPABILITY FOR WEAPON SYSTEMS PHASE-IN/PHASE-OUT NAVY (ASO and SPCC)

Program Data

Capability

The capability exists in the Navy UICP (Uniform Inventory Control Program) models and files to designate items as program related. For items so designated, the model computes the ratio of experienced demands over the past four quarters to experienced program over the past four quarters (excluding any quarters observations rejected by the demand filter). This ratio, or rate of demand per program element, is then applied to the anticipated program during various time horizons (e.g., procurement lead time, depot level turnaround time).

Types

ASO

- Flying Hours
- Number of Depot Level Repairs

SPCC

- Item Population for Weapon Systems Undergoing Significant Population Increases

Source

Program Planning Data Provided by CNO, NAVAIR, USAF, NAVSEA, NAVELEX, SSPO

ASO

- Flying hours by aircraft type (e.g., F4J)
- Number of overhauls by end item (e.g., TF41 engine)
- Actual data by month after occurrence

SPCC

Weapon System population increments - this data is provided throughout the fiscal year.

Actual data by month after occurrence

Computations

ASO

Program expanded from aircraft or end item down to applicable line items via subassembly breakdowns.

SPCC

Best replacement factor (failure rate) for a line item multiplied by population increment to determine additive demand to existing forecast.

Applicable Items

ASO

All investment except those on ground support equipment.

All expense during demand development interval (Up to 2 years beyond Preliminary Operational Capability Date).

80% of investment items are program related.

8% of expense items are program related.

SPCC

All items associated with weapon systems undergoing significant population increases.

Number of items varies from time to time but it consists of less than 10% of the inventory.

Application Data

Description of Data Files

Master Data File (MDF)

The principal inventory control file is the MDF, whose records are

keyed by National Item Identification Number (NIIN). The MDF contains complete application data for each NIIN, including the units per each application and the percentage of the application that contains the NIIN. A record is established for each application (next higher assembly) on which the NIIN is used. For purpose of application data an engine is considered a Weapon. The application data in the MDF is used to compute the program data used in the computation of Wholesale Requirements for each program related NIIN.

Weapon System File (WSF)

The WSF contains the same application data as the MDF, but the key to the WSF is application and a two character sub code known as AINAC (Application Identification Number Activity Code). The WSF is currently used for obtaining Parts Breakdown Listings. This is the configuration file for the Navy.

Demand Forecasting Using Program Data

ASO

Demands are recorded as recurring or nonrecurring based on the customers designation of demand type on the requisition. Only demands coded as recurring are used in computing demand forecasts. Recurring demands are further segregated by project code on the requisitions into maintenance and overhaul designations in the ICP's files. Overhaul demand applies to demands generated during depot level repair; maintenance refers to demands generated below depot level repair. For expense items demands coded as maintenance are divided by experienced flying hours while demands coded as overhaul are divided by actual depot repairs to arrive at a demand rate. For investment items maintenance and overhaul demands are combined and divided by experienced flying hours. This practice is due to the sporadic nature of demands for investment items at depots.

tenance and overhaul demands are combined and divided by experienced flying hours. This practice is due to the sporadic nature of demands for investment items at depots.

The following formulas apply to items coded as Program Related in the ICP's files, regardless of whether the item is applicable to ascending, steady, or descending programs.

(1) Maintenance Recurring Demand Rate Forecast for Expense Items

$$\frac{\text{Sum of Last 4 Quarters Maintenance Demands}}{\text{Sum of Last 4 Quarters Flying Hours}}$$

(2) Maintenance Recurring Demand Rate Forecast for Investment Items

$$\frac{\text{Sum of Last 4 Quarters Maintenance \& Overhaul Demands}}{\text{Sum of Last 4 Quarters Flying Hours}}$$

(3) Overhaul Recurring Demand Rate Forecast for Expense Items

$$\frac{\text{Sum of Last 4 Quarters Overhaul Demands}}{\text{Sum of Last 4 Quarters Depot Repairs}}$$

(4) Anticipated Demand during Procurement Lead Time

Expense Items

$$\left(\begin{array}{c}\text{Maint Demand}\\ \text{Forecast}\end{array}\right) \left(\begin{array}{c}\text{Anticipated Flying Hours during Items}\\ \text{Procurement Lead Time Average}\end{array}\right)$$

$$+$$

$$\left(\begin{array}{c}\text{Overhaul Demand}\\ \text{Forecast}\end{array}\right) \left(\begin{array}{c}\text{Anticipated Reworks during Items}\\ \text{Procurement Lead Time Average}\end{array}\right)$$

Investment Items

$$\left(\begin{array}{c}\text{Maint Demand}\\ \text{Forecast}\end{array}\right) \left(\begin{array}{c}\text{Anticipated Flying Hours during Items}\\ \text{Procurement Lead Time Average}\end{array}\right)$$

SPCC

In addition to the above program factor capability, the Navy has implemented a system designated "delta population" which essentially refore-

casts demands for weapon systems which are undergoing significant population increases. This process is accomplished using the best replacement factor (BRF)--an annual failure rate per application--multiplied by the population increment in order to obtain an estimate of the increasing demand. This "delta" demand forecast is used as input data to existing Navy provisioning models. The resultant procurement recommendation is loaded on the ICP files as a planned requirement with a material due date of the population increase. With delivery of the material, the planned requirement is removed with a corresponding increase to the observed demand.

A unique program exists for FBM (Fleet Ballistic Missile) submarine unique material. This program uses population increases to adjust demand forecasts.

Demand Trends

For items designated as non-program related, the normal forecasting routine is single exponential smoothing, i.e., the new average quarterly forecast is equal to the smoothing weight times the last quarterly observation plus one minus the smoothing weight times the old average quarterly forecast.

Normal Forecasting Routine Rules

New Quarterly Demand Forecast = A(Observation) + (1-A)(Old Average Forecast)

Where: $0 \leq A \leq 1$

For ASO, A = .2 and for SPCC A = .1 for "nontrending" items.
When computing the forecast for non-program related items, the inventory model checks increasing or decreasing trends. The check begins by computing the ratio of the sum of the last two quarterly observations multiplied by two and the sum of the last four quarterly observations. If the ratio is equal to or greater than an ICP set parameter and the last quarterly observation is greater than or equal to the old

forecast, the exponential smoothing weight, applied to the last quarterly observation is increased. Similarly, if the ratio is equal to or less than an ICP set parameter and the last quarterly observation is equal to or less than the old forecast, the exponential smoothing weight, applied to the last quarterly observation is increased.

Trending Test

$$T = \frac{2(\text{Sum of Last Two Observations})}{(\text{Sum of Last Four Observations})}$$

$$X_1 \geq T \geq X_2$$

X_1 = .99 at ASO and .9 at SPCC
X_2 = 1.5 at ASO and 1.1 at SPCC

The trending smoothing weight (A) equals .4 at ASO and .3 at SPCC.

Additionally, techniques employed for non-program related items are step increases and step decreases. For a step increase of decrease to occur, two successive abnormally high or abnormally low demand observations must be detected by a filtering process. On the first high or low filter reject, the old forecast is retained. When a step increase or decrease is detected, the inventory model computes a new forecast as the average of the two successive high or two successive low observations.

Filters on Observation

Limits on acceptable observation for repairables and fast moving consumables are:

Old Quarterly Demand Forecast ± t(Standard Deviation of Demand)
At ASO t = 3; at SPCC t = 6

Limits on acceptable observations for slow moving consumables are:

Maximum [V, 3(Old Average Forecast)]
Where V = 15 at ASO and 2 at SPCC

If the observation is outside filter limits:

No revised forecast is computed for the first observation.

If two successive quarters (both high or low) then:

New Quarterly Demand Forecast = .5(Sum of Last Two Observations)

ASO

Step increases and decreases can occur on program related items, since observations are submitted to filtering. However, when step increases or decreases are detected on program related items, the forecast is computed as the ratio of the past four quarters demand to the experienced program, including those previously rejected by the filter, multiplied by the projected program.

Planned Improvements

SPCC

A new inactive item program is scheduled for release in December 1980. This program identifies items which have not experienced any demand for a given time interval. The items are observed for another given time period and if no demand occurs, they will become candidates for decataloging action.

ASO

Use of Program Data for Declining Programs

ASO is preparing an internal instruction which will provide the following direction for computation of requirements for items peculiar to declining programs:

I. Wholesale Levels

1. A list of Weapons/Engines with declining programs will be published.
2. For all non-program related expense items with a procurement deficit of $100,000 or greater or designated for "High

Intensity Management" (i.e. Value of Annual Demand ≥ $12,000 and quarterly requisition frequency average ≥ 5), the Item Manager (IM) will:

a. Recompute the forecast and levels using the applicable program data. If the recomputation results in lower requirement the IM will code the item program related in file, ensuring that all application data is correctly reflected in file. If the recomputation does not reduce the requirement, regardless of program decline, the IM will investigate.
b. Reduce the safety level to zero if the rate of decline during procurement lead time or the year following procurement lead time is less than a specified percentage (not yet determined).
c. Reduce Reorder Point to x% of procurement lead time if the rate of decline during lead time or the year following lead time is greater than a specified percentage.

II. Retail Levels

1. A list of site de-outfittings will be published, with anticipated de-outfitting dates. IM will use this data as follows:
   a. Operational Support Inventory (OSI) requirements for Transaction Item Reporting (TIR) activities will not be included in procurements for investment or expense items if the site will not require the item for at least one year after Procurement Lead Time (PLT).
   b. Investment item assets reported by cyclic asset reporters scheduled to de-outfit within one year after PLT will be considered in procurement computations. Expense items in excess to the sites projected demand will be considered in procurement computations.

SYSTEM CAPABILITY FOR WEAPON SYSTEMS
PHASE IN/PHASE OUT-AIR FORCE

Program Data

Investment

Program data is used for each item at all Air Force inventory control points. The past program, in conjunction with past failures, is used to develop demand/usage rates. These rates are applied to the future program to project anticipated future usage or requirement. The base period for the past program and failures is two years. The G033J system maintains the past program data and the K004 system maintains the future programs. These programs are updated quarterly. These systems contain program data by type and are the source for program data for the requirements computation system (D041). The type of program used is determined by the Program Select Code in the requirements computation system. Both Organizational Intermediate Maintenance (OIM) and Depot Level Maintenance (DLM) programs may be indicated in the Program Select Code and in turn reflected in the requirements computation.

TYPE	SOURCE
Flying Hours	Programming Authority (PA)
Equipment Months	D039 - Equipment System
Drones	Programming Authority (PA)
Depot Level Maintenance (DLM)	Next Higher Assembly Data
Engine Hours	Aircraft Flying Hour Program

Expense

These items are computed using an average monthly demand rate based on a maximum of a two year past history. The computed demand rate is factored by a program ratio. Program ratios are assigned by System

Management Code (SMC). This is applicable to all items which have peculiar application to weapon systems that compute program ratios of 115% or more, or 90% or less, currently, this applies to 56,897 items out of 548,347. Common items do not have an SMC and are assigned a program ratio of 1.000.

TYPE	SOURCE
Program Ratio (PA)	Programming Authority

Demand Forecasting Using Program Data

Investment

The failure rate is applied to the future program data to determine projected failures or requirement. For ascending or descending programs, factors based on a one year history and/or forecasted factors may be used. The forecasted factors are interpolated for 3 years with the third year forecast straightlined through the end of the computation.

Expense

The average monthly demand rate is multiplied times the program ratio. For ascending or descending programs, one year moving average can be used instead of two years.

Trends

For any item, trends are portrayed by the use of one year history instead of two years. Also, for investment items, a pre-log model which forecasts future demands based on regression analysis technique can be used instead of the normal single moving average.

Planned Improvements

The capability to provide programs by rounds and sorties is planned to be available for investment items. These improvements are planned in conjunction with the conversion of the D041 system to CYBER equipment currently scheduled for February 1982.

SYSTEM CAPABILITY FOR WEAPON SYSTEMS PHASE IN/PHASE OUT--DLA

Program Data

The capability exists in the DLA standard system to designate items as program related. This capability can be used when DLA managed items are identified by a Military Service as peculiar within that service to the program data provided, i.e., XM-1 tank parts peculiar within Army to the XM-1 tank and comparative density based program data for the XM-1.

Normally, the program change factor to be inserted would be obtained from the Military Service. If program data consists of relative density numbers or flying hour numbers associated with different time periods, the program change factor would be developed by dividing future period data by the base period data and the resulting program change factors would be inserted in the record.

Demand Forecasting Using Program Data

The as yet unadjusted forecast demand rate is developed using a double exponential smoothing technique applied to all demands considered to be recurring in nature. This excludes certain demands identified to non-recurring programs (Special Program Requirements requisitions as described in Chapter 12 of MILSTRAP, Prepositioned War Reserve deficiency requisitions, a proportion of Non-Recurring demands as coded by the customer for items managed as high dollar value items, etc.) or to requisitions unauthorized for supply from normal stock (Foreign Military Sales, Direct Sales).

The items designated for forecasting that use program data are so identified in the file by Military Service, along with the applicable program change factors for each of the succeeding 12 quarterly periods. The quarterly demand forecast is adjusted for each of the program periods

by applying the program change factor to that services proportionate share of the forecast. The last forecast (the twelfth period) is straight-lined for subsequent time periods. The file is updated quarterly to provide a rolling 12 quarters of program data.

The predicted recurring demand for each time period, as adjusted, is then used in appropriate levels computation.

The use of program change factors, as described, will apply to either phase-out or phase-in situations as well as variable programs over time.

Demand Forecasting Using Trends

To date (April 1980), the program change factoring technique has not been employed by DLA. Recurring requirements forecasts are developed for all Class IX items using single and double exponential smoothing, which provides for trending.

The system also measures the degree by which the forecast varies from the actual. When the system forecast varies by more than what is considered as an acceptable degree (two standard deviations) for two successive forecast periods and in the same direction (underforecast or overforecast), the amount of weight applied to the most recent observation of demand (the Alpha Factor) is automatically increased by 0.1 for the next two forecasts to compensate for an apparent trend. If this has not corrected the problem, the item manager is advised for manual review and decision.

Planned Improvement

DLA's concept of the use of program change factors has not been tested in actual use for lack of any identified situations and data which could be applied to service identified items. Efforts are underway to obtain such data on an initial test effort during the next year from Army for the XM-1 tank. The results of this effort and its apparent benefit are

expected to provide some basis for subsequent planned improvements including selective expansion of the program's use where considered suitable. The duplication of effort which may result from applying program change factors to an already trended demand rate will be examined to determine the effect and possible alternatives.

APPLICATION DATA--ARMY

Description of Files

The Army utilizes a National Stock Number Master Data Record (NSNMDR) which contains virtually everything known about any given NSN that the Army manages or has interest in. Two key elements of this data are:

(1) Next Higher Assembly, and
(2) End Item Application

Usage of Application Data in Requirements Computation

End item application is used in conjunction with maintenance failure rates to develop programed requirements to support planned maintenance programs and to activate the program data file to access the appropriate program change factors in requirements determination computations. Application Files are also used to develop recommended initial support lists. These files are updated as required (e.g., introduction of a new system using the item, etc.).

APPLICATION DATA--NAVY
(ASO)

Description of Files

Master Data File (MDF)

The principal inventory control file is the MDF, whose records are keyed by National Item Identification Number (NIIN). The MDF contains complete application data for each NIIN, including the units per each application and the percentage of the application that contains the NIIN. A record is established for each application (next higher assembly) on which the NIIN is used. For purpose of application data an engine is considered a Weapon. The application data in the MDF is used to compute the program data used in the computation of Wholesale Requirements for each program related NIIN.

Weapon System File (WSF)

The WSF contains the same application data as the MDF, but the key to the WSF is application and a two character sub code known as AINAC (Application Identification Number Activity Code). The WSF is currently used for obtaining Parts Breakdown Listings. Future plans are to use WSF in development of AVCAL's (Aviation Consolidated Allowance Lists).

APPLICATION DATA--NAVY
(SPCC)

Description of Files

Master Data File (MDF)

The principal inventory control file is the MDF, which contains line item characteristics data including application information. At SPCC, since the mechanized wholesale VSL/EOQ demand forecast does not utilize program data, the item data collected in the MDF is simply extracted and utilized in an exponentially smoothed forecasting routine. The data collection, extraction and forecasting processes are extensively covered by the VSL/EOQ Subgroup.

Weapon System File (WSF)

The WSF provides a breakdown from unit (Ship/activity) to major component/application to line item. It is planned that, once weapon systems are clearly defined, the WSF will provide a breakdown as follows: unit to weapon system to component/application to line item. Currently, the WSF is used as the primary input data source to developing shipboard allowance lists.

APPLICATION DATA-AIR FORCE

Description of Files

For investment items, the item application contains the NSN or system and the applicable program select code, application *percent*, *program* begin date, quantity per application and the application essentiality code. These elements of data are file maintained by the equipment specialist. For expense items, the item application contains the NSN or system application with the QPA and is file maintained by the item manager.

Usage of Application Data in Requirements Computation

For investment items, the application data is used to determine which programs are to be used in computing an item's future requirement and serves as a linkage for selection of program information. The equipment specialist can tailor program information to a particular item by use of application data with the following elements.

(1) Program Begin Date - the time when an item will be required to support a particular program.
(2) Application Percent - tells how much of a particular program the item is used for.
(3) Program Select Code - tells which type of program data, such as flying hours, overhaul, etc., is to be considered.

For expense items, application data is used to assign program ratio.

APPLICATION DATA--DLA

DLA does not have an application file. Selected essential items have been identified to DLA by the Services as applicable to individual important weapon systems under the Weapon System Support Program. DLA does not have any provision for use of application data in its standard requirements forecasting system.

2.0 ESSENTIALITY

WEAPON SYSTEMS RELATIONSHIP
ESSENTIALITY

During provisioning, all Military Services identify essential items applicable to a new weapon system. All DoD Components use this information in the initial stockage decision. Individual Military Service processes for refining or expanding on the essentiality determination vary and will be described later, by Service. Generally, the purpose for essentiality coding is to establish the basis for some of the following types of actions in addition to the initial stockage decision:

a. Selection for war reserve requirements planning.

b. Use of a higher essentiality factor in the VSL computation. This practice is presently employed by the Navy and is planned for use by the Air Force.

c. Ranking by relative essentiality is used to prioritize repair scheduling for repairables.

d. Advise the inventory manager, when not also the weapon system manager, of the importance of individual items. This is of particular value when the inventory manager is of another Service or DLA.
A synopsis of the current practice follows:

Army: Essentiality coding is used to select items for war reserve requirements and to make initial stockage decisions. The Army is planning to also use such coding in tailoring authorized stockage lists. The footnotes on following charts reflect applicable codes.

Navy: In the wholesale system, the structure exists to use essentiality coding (employing a data element number)in the replenishment requirements system as a basis for obtaining higher safety levels for selected weapon systems; e.g., support of FBM submarines, nuclear reactors, and TACAMO. For TRIDENT and SSPO (missile systems only) retail allowances, a relative essentiality ranking system of from 1 to 116 is used to determine both the range and depth of stock to be carried in the submarine.

Air Force: In addition to the initial stockage decision based on essentiality, AF employs a three digit essentiality coding system for all AF managed items. These codes are presently used for the selection of war reserve items and the prioritization of repair scheduling for repairable items. The AF plans to use this system in the allocation of war reserve funds and in the VSL computation.

DLA: An initial stockage decision is made on the basis of essentiality coding as well as economic criteria. In addition, approximately 190,000 different items managed have been identified by the Services as essential to first line weapon systems. These items are all stocked irrespective of demand and are given greater management attention, as well as full funding support during periods of funding austerity.

ESSENTIALITY CODING - ARMY

Extent of usage in wholesale system requirements calculation.

- o Description of usage: The Army has coded a factor of one into the VSL/EOQ formula which in essence does not provide any essentiality consideration in requirements calculations.

- o Management Actions: An items essentiality coding is the principal activator that determines whether that item qualifies for war reserve requirements. Also when phasing in a new weapons system the essentiality code qualifies an item for minimum stockage consideration when expected demand does not meet stockage criteria.

- o Essentiality codes: The following charts display the codes and definitions of MIL-STD-1552 and the corresponding, replacing codes and definitions of AR-708-1 used by the Army.

  The Army is also developing procedures to tailor authorized stockage lists to emphasize items coded essential.

Essentiality Codes Used By Army

MIL-STD-1552

Code	Definition
1	Failure to this part will render the end item inoperable
3	Failure to this part will not render the end item inoperable
5	Item does not qualify for the assignment of code 1 but is needed for personnel safety.
6	Item does not qualify for the assignment of code 1 but is needed for legal, climatic, or other requirements peculiar to the planned operational environment of the end item.
7	Item does not qualify for the assignment of code 1 but is needed to prevent impairment of or the temporary reduction of operational effectiveness of the end item.

AR 708-1 Chapter 7

Code	Definition
C	A repair part required to support a maintenance operation, at a field maintenance level or organizational maintenance level, that must be performed to insure that the end item continues to be capable of performing its intended combat or combat support mission. Essential.
D	A repair part that is not required in support of an essential field maintenance or organizational maintenance function (code C) but is required for operator/crew safety during training and/or in garrison. Safety.
E	A repair part that is not required in support of an essential field maintenance or organizational maintenance function (code C) but is required to meet climatic conditions or to meet legal requirements, or the requirements of a host nation in an overseas environment. Legal/climatic.
F	A support item used only at depot maintenance level.
G	A repair part that is not required in support of an essential field maintenance or organizational maintenance function (code C), or for crew/operator safety (code D), or legal requirement (code E) or deferrable maintenance operation (code F). Not essential.

J	A support item required to support a maintenance operation at a field maintenance or organizational maintenance level, but which may be deferred in wartime without causing degradation of the end item to the extent that it is unable to perform its mission, but must be performed as soon as operational considerations and parts availability permit. Includes servicing type items.

Note: All codes except MIL-STD-1552 Code 3 and AR 708-1 Code G qualifies an item for War Reserve and/or Initial Provisioning mandatory stockage.

All codes except MIL-STD-1552 Code 3 and 7, and AR 708-1 codes F and G qualify an item for essentiality consideration in establishing Combat Essential Authorized Stockage Lists at the retail level.

MIL STD 1552/AR 708-1

ESSENTIALITY CODE CORRELATION

MIL-STD-1552		AR 708-1
1	With Maintenance Code = O, F or H	C
1	With Maintenance Code = D	F
3		G
5	With Maintenance Code = O, F or H	D
5	With Maintenance Code = D	F
6	With Maintenance Code = O, F or H	E
6	With Maintenance Code = D	F
7		F

Notes:

1. Maintenance Codes are contained in joint regulation: AR 700-82, OPNAVINST4410.2, AFR 66-45, MCO 440.120, and DSAR 4100.6.

2. AR 708-1 Code J is manually assigned by maintenance engineers.

ESSENTIALITY CODING - NAVY

ASO

Essentiality is used in the wholesale safety level calculation. Specifically it is a multiple of the shortage cost in the risk formula. Since a system for developing the relative essentiality of items has not been established, ASO has the essentiality data element in the Master Data File set to .01 for all items except for items peculiar to one weapon system, (TACAMO) which are set to .99. The essentiality code is not used in calculating retail requirements.

In order to provide a higher SMA, and implying a higher essentiality on this segment of the inventory, ASO's Budget Execution Plan provides for a minimum 6 months EOQ on expense items with high frequency, high Value of Annual Demand (VAD). In addition, safety level has been increased on 5R Cog (consumable) items, the expense items supporting launching and arresting gear, in order to reach the 85% SMA goal.

In addition, ASO's Budget Execution Plan forces zero reorder level and EOQ of 1 unit on 1R Cog (consumable) items with quarterly units demand forecast less than 1 unit. Not Mission Capable Supply/Partial Mission Capable Supply (NMCS/PMCS) history is being examined with the intention of establishing NSO quantities for items with NMCS/PMCS.

SPCC

SPCC codes all item in the Master Data File with the same essentiality factor (.5), as Uniform Inventory Control Point programs provide for the use of item essentiality in the variable safety level calculation at the wholesale level. However, no agreement has been reached within Navy as to which item is more essential than another except for FBM/Nuclear Reactor/TRIDENT weapon systems items.

SPCC's budget execution plan policy provides more safety level to the faster moving items. This is accomplished by varying the shortage cost and the maximum risk setting in the UICP inventory model. This policy implicitly applies higher essentiality to fast moving items.

As a further approach to recognizing the need to stock essential items, SPCC's budget execution plan forces zero reorder levels on low demand items. To preclude zero reorder levels on low demand items which SPCC regards as essential, a Numeric Stockage Objective (NSO) policy was established. This policy states that all items that are allowed on board ships or have been CASREPTed (Casualty Reported) or cannibalized by the fleet will have a reorder level of a minimum replacement unit.

Based upon CNO designated supply material availability (SMA) goals, certain weapon systems have higher established goals and hence are more essential. The FBM weapon system support material (95% SMA), nuclear reactor support material (95% SMA), and TRIDENT submarine support material (90% SMA) have more safety level established to achieve those higher goals for weapon system unique items. Items on those weapon systems common to other systems have fixed safety level added to insure greater protection.

The shipboard allowance model (Fleet Logistic Support Improvement Program) incorporates a capability for use of item essentiality. However, approximately 95% of all items are regarded as essential.

The new TRIDENT weapon system has coded each of its items with a Military Essentiality Coding (MEC) ranging from most essential (116) to least essential (1). Greater range and depth are given to more essential items for stocking on board the TRIDENT submarine. The Strategic Systems Project Office has a similar system for the FBM weapon system. Other Hardware Systems Commands are currently investigating use of this approach for other systems (e.g., FFG-7 class).

ESSENTIALITY CODING - AIR FORCE
(EXPENSE)

CAPABILITY

A 3-digit essentiality code will be implemented in the DO62 system 1 June 1980.

1st Position - Represents the weapon system ranking and is developed from the Logistic Support Priorities that is provided by the Air Staff. Updated mechanically.

2nd Position - Represents the essentiality of the subsystem in relation to the weapon and is provided by the major Air Commands. Updated mechanically and manually.

3rd Position - Represents the essentiality of the item in relation to the subsystem and is provided by the equipment specialist (ES). Updated through manual file maintenance.

USE

The following uses are planned for the essentiality code:

Allocate available WRM funds to items with computed deficits to Other War Readiness Materiel (OWRM).

Allocate POS funds when there are budget cuts.

Determine relative essentiality in VSL computation.

ESSENTIALITY CODING - AIR FORCE
(INVESTMENT)

CAPABILITY

A 3 digit essentiality code has been implemented in the D041 system and is now available for use. The code is made up of the following:

1st Position - Represents the weapon system ranking and is developed from the Logistic Support Priorities that is provided by the Air Staff. Updated mechanically.

2nd Position - Represents the essentiality of the subsystem in relation to the weapon and is provided by the Major Air Commands. Updated mechanically and manually.

3rd Position - Represents the essentiality of the item in relation to the subsystem and is provided by the equipment specialist (ES). Updated through manual file maintenance.

USE

The essentiality codes are currently used to determine which items are to be excluded from the Other War Readiness Materiel (OWRM) Computation. The code is also used in the prioritization of repair workloads. The code is not used in the Variable Safety Level (VSL) computation, however, plans are to implement a Data Automation Requirement (DAR) subsequent to D041 conversion to CYBER equipment, that will use the 3 digit essentiality code in the VSL computation. The code is not used in the intensity of item inventory management. This is accomplished by the "Selective Management" concept that was implemented 1 January 1980 in the D041 in compliance with DoD Instruction 4140.33.

ESSENTIALITY CODING - DLA

Extent Used in Wholesale System

Requirements Computation

The DLA VSL computation has a capability to use an essentiality code. It has a logarithmic effect on the result and is less influential than either MAD over lead time or the procurement cycle value (EOQ).

All DLA Centers use an Essentiality Factor of 1 except DESC which has been authorized to use essentiality factors of 2 through 6 for selected groups of items. DESC uses an Essentiality Factor of 2 for all items having between 20 and 199 annual requisition frequency with an annual demand value of $4,500 or over. DESC uses an Essentiality Factor of up to 6 for all items receiving 200 or more requisitions annually. Both of these exceptions were authorized by OSD.

Essentiality as determined by DESC was determined on the basis of demand frequency. This suggests that all items are of equal or undeterminable essentiality but that equipment support and readiness are more influenced by the availability of items used regularly and less by those only needed randomly.

Management Actions

Many management actions are taken with the objective of ensuring higher availability of items demanded frequently. Such items are grouped for management attention and are reviewed critically in summary data analyses. Support during times of funding shortage is biased towards these items, backorder review boards tend to concentrate on actions needed to improve current status on both an immediate and long term basis, etc. Management actions relating to service identified weapon systems items are discussed in Section 4, Current Weapon Systems Management - DLA.

Literature Search - Essentiality

The literature search encompassed a thorough search of Military Services and contractor study activity in the area of "item essentiality coding and usage". The more beneficial results came from a review of the bibliographies, abstracts and documents from the Defense Logistics Studies Information Exchange (DLSIE) and the Defense Technical Information Center (DTIC) (formerly the Defense Documentation Center, DDC). These sources identified studies done by contractors, universities, Logistics Management Centers of the respective services, and other logistics activities.

CACI included a review of academia and business publications at the Library of Congress to complement the search of the Military environment. The review consisted of dozens of textbooks in the significant subject categories of Materials Management and Inventory Control and a complete search of the Business Periodical Index from August 1971 through the present day. The Business Periodical Index includes but is not limited to prestigious publications such as Business Economics, Business Horizons, Data Management, Financial Management, Harvard Business Review, Journal of Economics and Business, Econometrica, Management Today and Management Science.

A significant conclusion that can be drawn from the literature search of essentiality is that the treatment of this subject as an integral segment of requirements computations is a Military unique subject. The only significant treatment of the subject in a textbook is by an author (James W. Prichard) known to be a Navy civil service employee.

References

Barlow, Richard E. and Proschan, Frank, "Mathematical Theory of Reliability", The SIAM Series in Applied Mathematics, edited by R.F. Drenick, Harry Hochstadt, and Dean Gillette. New York: John Wiley and Sons, 1965, p. 162.

Bracken, Jerome, "Selected References in Utility Theory and Military Essentiality", The George Washington University, Agency Report No. T-138/62, Washington, D.C., July 1962, (LD No. 06673*).

Brewin, Lieutenant Commander Robert L., "A Review of the Concept of Military Worth and Its Application in Decision Making", Naval Postgraduate School, Monterey, California, June 1964, (LD No. 07869K).

Brown, Robert G., "Military Essentiality Codes", Little (Arthur D.) Inc., Final Report, Cambridge, Massachusetts, May 1963 (LD No. 0 5845J*).

* Available from DLSIE

Brown, Robert G., "Safety Stocks for High MEC Items", Little (Arthur D.) Inc., Cambridge, Massachusetts, September 1962, (LD No. 05843Y*).

Brusco, Peter A. and Rosenman, Bernard B., "Military Essentiality Coding", U.S. Army Logistics Management Center, Philadelphia, Pennsylvania, July 1968, (LD No. 09304A).

Denicoff, Marvin; and Solomon, Henry, "Simulations of Alternative Allowance List Policies", Naval Research Logistics Quarterly, Vol. 7, No. 2, June 1960, pp. 137-149.

Denicoff, Marvin; Haber, Sheldon E. and Varley, Thomas C., "Military Essentiality of Naval Aviation Repair Parts", The George Washington University, Washington, D.C., October 1962 (LD No. 05503*).

Denicoff, Marvin; Fennell, Joseph; and Solomon, Henry, "Summary of a Method for Determining the Military Worth of Spare Parts", Naval Research Logistics Quarterly, Vol. 7, No. 4, September 1960, pp. 221-234.

Denicoff, Marvin; Haber, Sheldon E.; Fennell, Joseph; Marlow, W.H.; Segel, F.W. and Solomon, Henry, "The Polaris Military Essentiality System", George Washington University, Washington, D.C., July 1964. Published in Naval Research Logistics Quarterly, Vol. 11, No. 4, December 1964, pp. 235-257, (LD No. 05942).

Gabriel, R.J., "Shipboard Allowance Determination", Navy Fleet Material Support Office, Agency Report No. 136, Mechanicsburg, Pennsylvania, March 1979, (LD No. 43707A*).

Karr, H. W., "A Method of Estimating Spare-Part Essentiality", Naval Research Logistics Quarterly, Vol. 5, No. 1, March 1957, pp. 29-42.

Kraut, Willi K., and Ivanovic, Nicholas P., "Analytical Procedure for Determination of Military Essentiality Index", Naval Air Test Facility, Lakehurst, New Jersey, Final Report, July 1971 (LD No. 27077).

Logistics Management Institute, "Measurements of Military Essentiality", LMI Task No. 72-3, Washington, D. C., August 1972, (LD No. 26623A*).

Matalavage, Joseph Anthony, "A Review of Shipboard Allowance Computation and the Use of Military Essentiality Coding", Thesis, 87p., Naval Postgraduate School, Monterey, California, March 1973, Chapters V and VI.

McMahon, Major Gary C. and Gambill, Lt. Col. Jack H., "Air Force Item Essentiality", Air Force Logistics Command, Wright-Patterson AFB, Ohio, November 15, 1978.

* Available from DLSIE

Navy Fleet Material Support Office, "Provisioning - Essentiality", Alrand Report No. 16, Mechanicsburg, Pennsylvania, June 1960, (LD No. 05343*).

Prichard, James W. and Eagle, Robert H., "Modern Inventory Management", John Wiley and Sons Inc., 1965, pp. 146-148.

Proschan, Frank, "Optimal System Supply", Naval Research Logistics Quarterly, Vol. 7, No. 4, December 1960, pp. 609-646 (Published as Electronics Defense Laboratories Engineering Report EDL-E38).

Smith, Jack W. and Fisher, William B., "Test of a System Which Considers the Priority Allocation of Spare Recoverable Components", Logistics Management Institute, LMI Task No. 73-7, Washington, D. C., August 1974, (LD No. 26623C*).

Smith, Jack W. and Fisher, William B., "The Measurement and Coding of Military Essentiality of Navy Parts, Components and Equipment", Logistics Management Institute, LMI Task 73-5, Washington, D. C., December 1973, (LD No. 29981).

Solomon, Henry, "The Determination and Use of Military Worth Measurements for Inventory Systems", Naval Research Logistics Quarterly, Vol. 7, No. 4, December 1960, pp. 529-532.

Solomon, Henry; Fenell, Joseph P.; and Denicoff, Marvin, "A Method for Determining the Military Worth of Spare Parts", The George Washington University, Washington, D. C., April 1958, (LD No. 17656).

Solomon, Henry, "An Exposition on the Development and Application of Military Essentiality Measurements", The George Washington University, Washington, D. C., June 1967, (LD No. 16763).

Sutton, S. Scott, "Methods of Scaling Military Essentiality Codes", The George Washington University, Task 0001, Project No. 047001, Office of Naval Research, Technical Memorandum, Serial TM-14264, Washington, D. C., June 1967.

Szeto, Thomas, "Trident COSAL Study", Navy Fleet Material Support Office, Mechanicsburg, Pennsylvania, March 1977, (LD No. 38329A*).

* Available from DLSIE

3.0 LONG SUPPLY

Long Supply Analysis Data

The first chart in this section depicts the number of expense type NSN's in long supply in the sample taken by the Components. The items are categorized into four major primary groupings. These groupings are compatible with the chart reflecting dollars as recorded in Chapter 3, Task 0003.

The charts on pages 3-3 thru 3-9 are summations of Component collected data for Fiscal Years 1977 through 1979. The first charts show the Components Stock Fund and Investment disposal as a percentage of potential excess plus disposal. Fiscal Year 1979 also shows the dollar value of the disposals. The next three charts (3-7 through 3-9) reflects the Stock Fund and Investment long supply as a percentage of on hand inventory. Fiscal Year 1979 also reflects the dollar value.

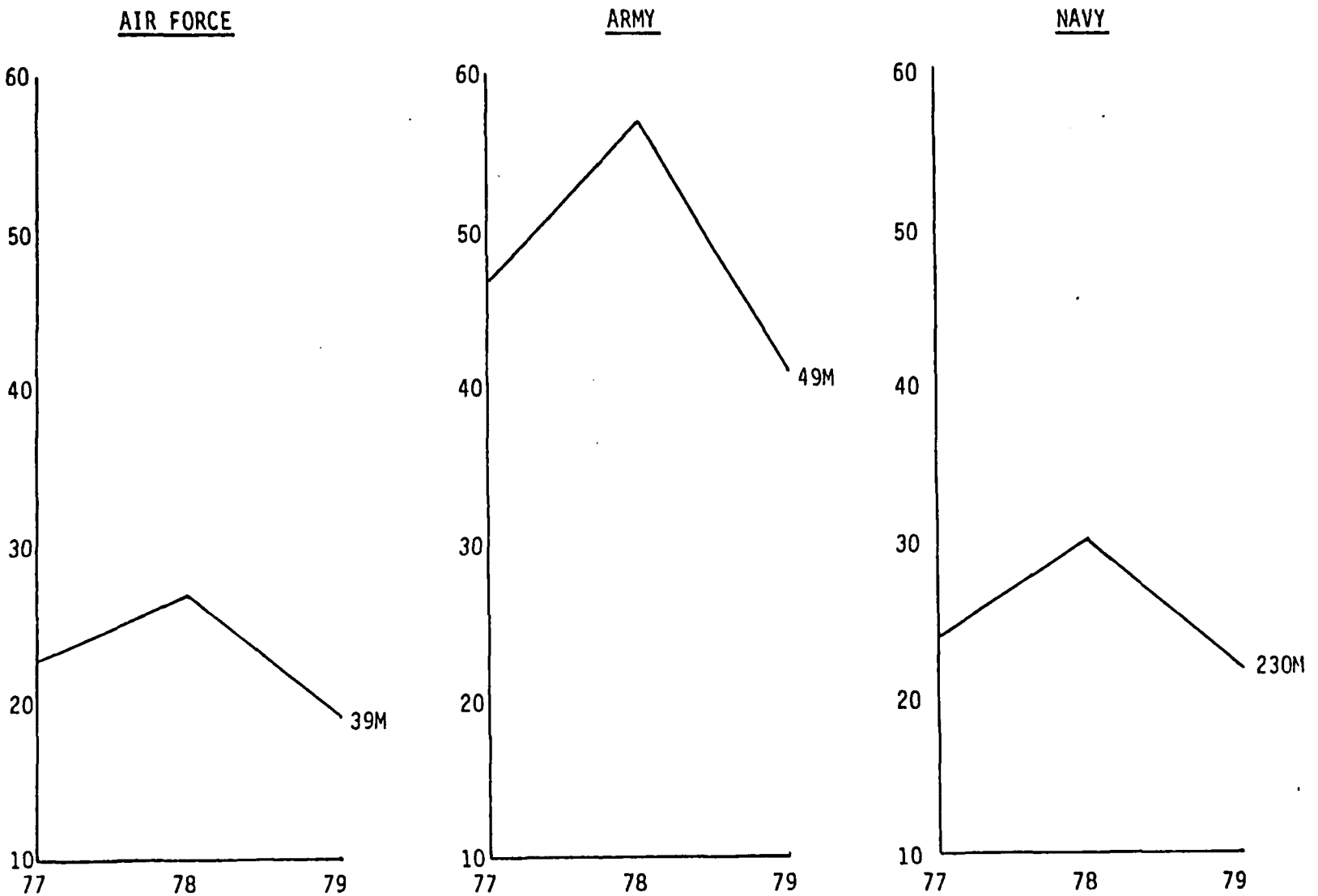
The last four charts (3-10 through 3-13) are the detailed, Components Long Supply summary analysis. These charts formed the basis for analysis and led to the conclusions/recommendations on the significant role phase-out played in the generation of long supply.

NUMBER OF NSN's IN LONG SUPPLY (EXPENSE ONLY)
(BY PRIMARY GROUPINGS)

	ARMY		NAVY		AIR FORCE		DLA		TOTALS	
	ITEMS	%	ITEMS	%	ITEMS	%	ITEMS	%	ITEMS	%
PROVISIONING	57	6	71	18	90	11	6	1	224	8
PHASE-OUT	408	40	139	34	151	20	36	5	734	25
OTHER	423	42	107	26	418	52	524	79	1,472	51
UNKNOWN	121	12	89	22	57	7	97	15	364	13
MULTIPLE REASONS	____		____		84	10	____		84	3
TOTAL	1,009		406		800		663		2,878	
TOTAL NSN's IN LONG SUPPLY	250M		237M		306M		473M		1,266M	
SAMPLE %	.4%		.2%		.3%		.1%		.2%	

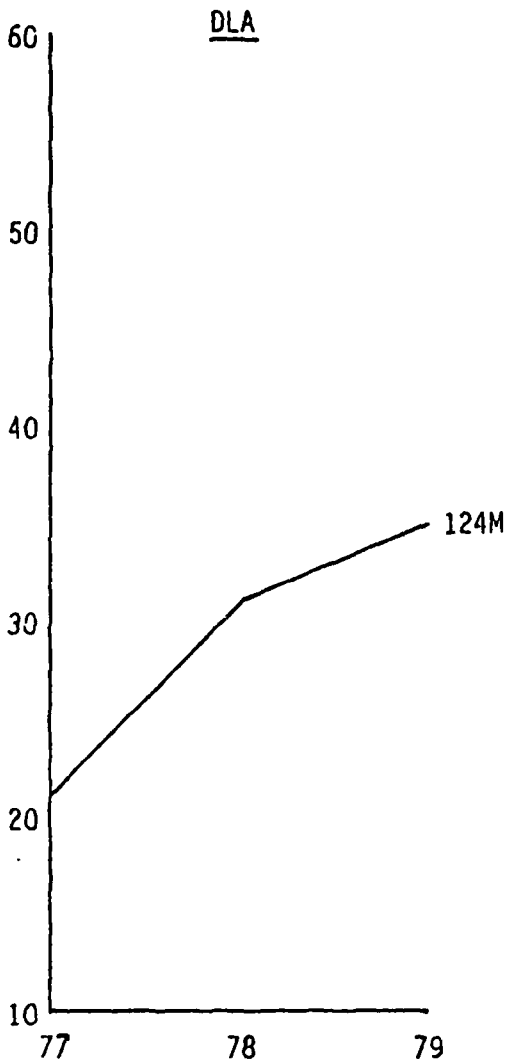
WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

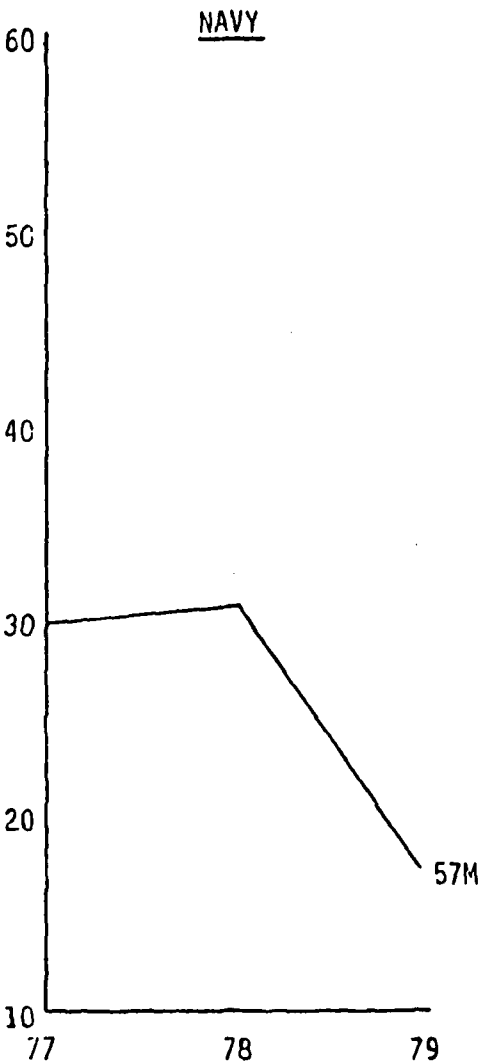
Investment Disposal as a % of Potential Excess Plus Disposal



WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

Stock Fund Disposal as a % of Potential Excess Plus Disposal

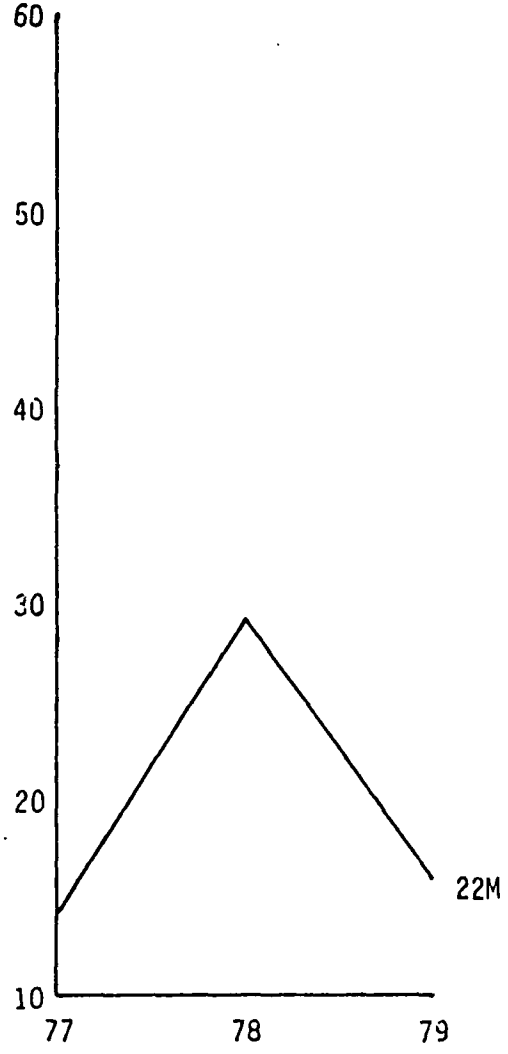




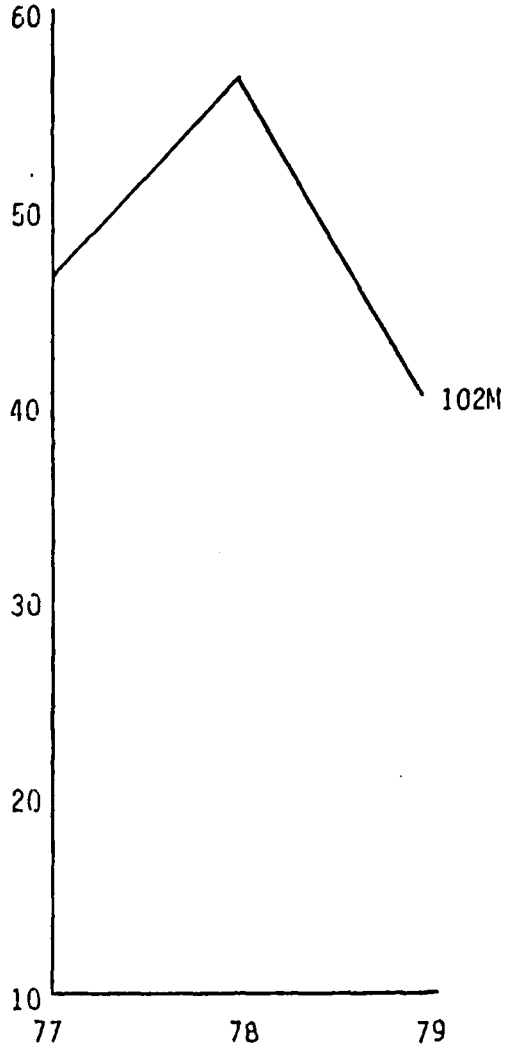
WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

Stock Fund Disposal as a % of Potential Excess Plus Disposal

AIR FORCE

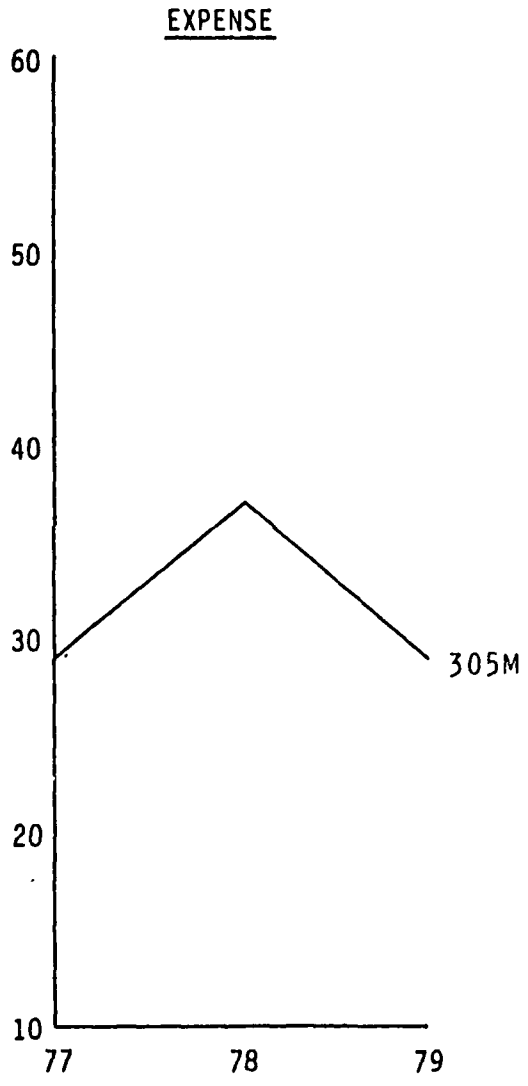


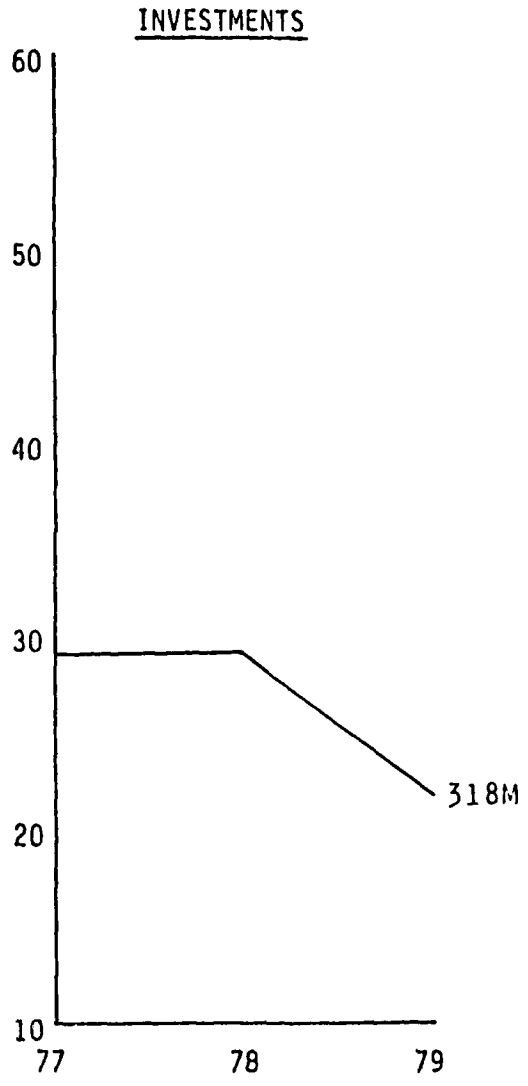
ARMY



WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

Disposal as a % of Potential Excess Plus Disposal

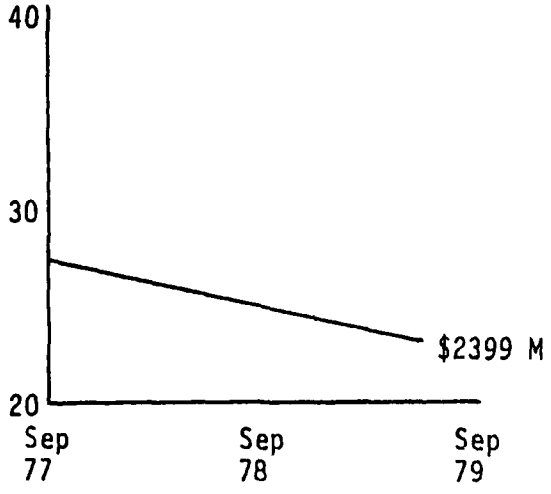




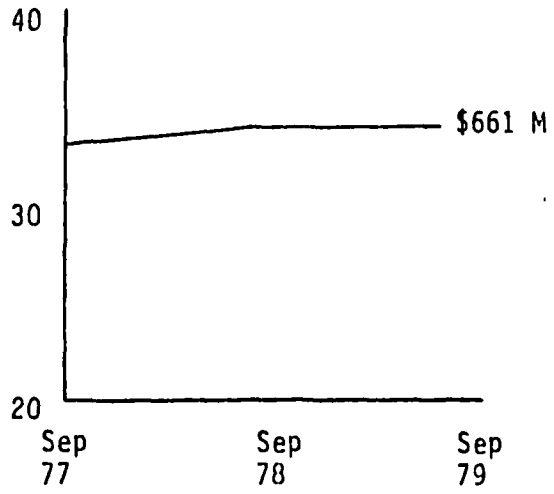
WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

Investment Long Supply as a % of On Hand Inventory

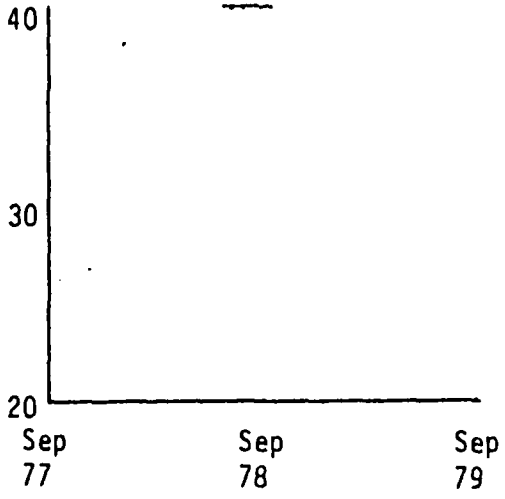
AIR FORCE



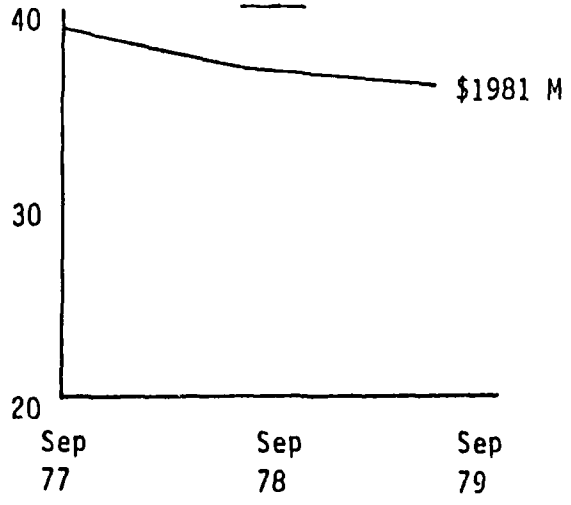
ARMY



DLA

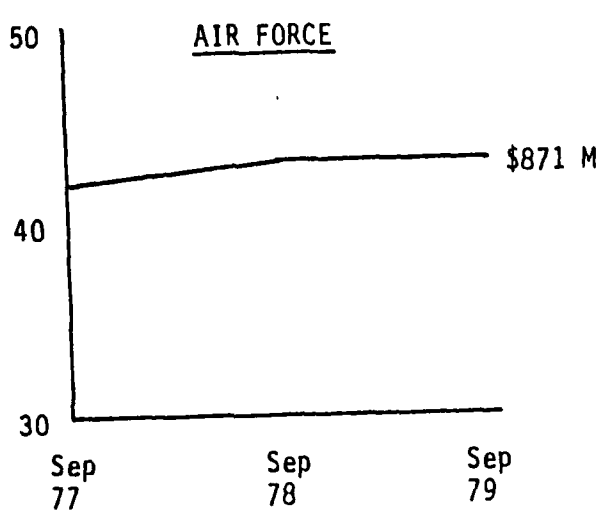


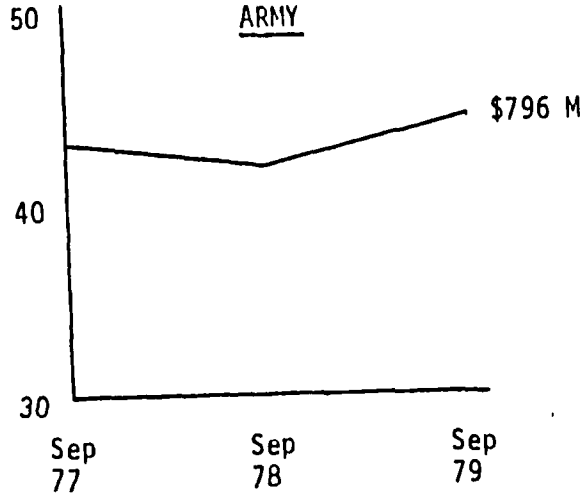
NAVY

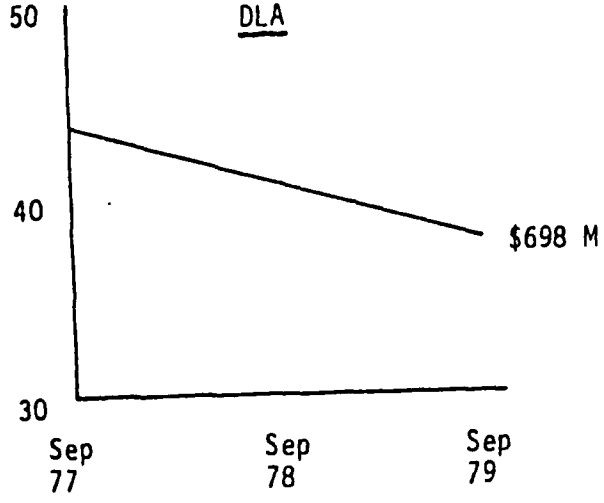


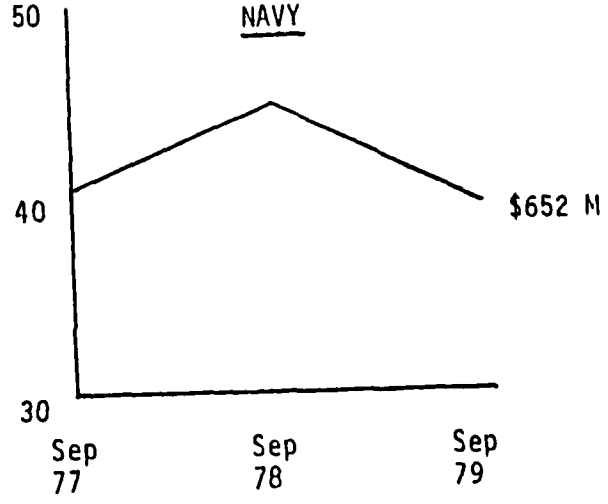
WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

Stock Fund Long Supply as % of On Hand Inventory





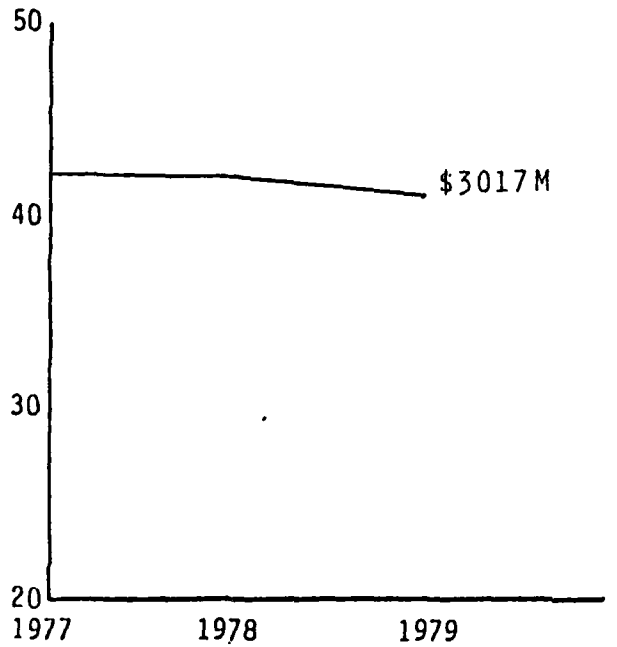




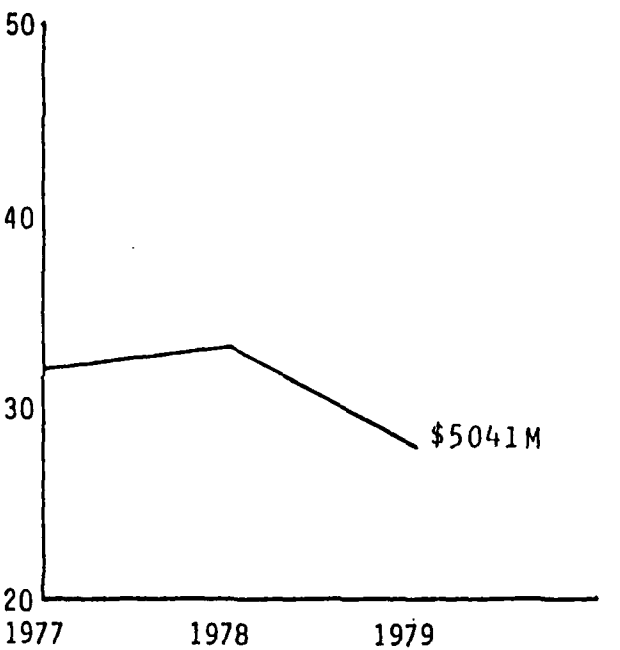
WEAPONS SYSTEMS RELATIONSHIP SUB-GROUP

Long Supply as % of on Hand Inventory

EXPENSE



INVESTMENT



ARMY LONG SUPPLY SUMMARY
ITEMS: 1,009
$ VALUE: 249,876,000

OSD STUDY GROUP
SECONDARY ITEM STOCKAGE POLICY
REASONS FOR LONG SUPPLY

($ IN THOUSANDS)

	GROUP A		GROUP B		GROUP C												GROUP D		Total	
	Provisioning		Phase-Out		Understated Requirements		Decreased Requirements		Overstated Requirements		Life of Type Buy Out		Logistics Transfers		Unit/System Deactivations		Other			
	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.
SUMMARY	57	8,786	408	107,330	28	4,330	214	58,683	43	9,008	94	24,858	7	1,478	37	15,338	121	20,065	1,009	249,876
ARRCOM	7	1,272	112	54,979	4	638	38	16,796	6	1,977	4	1,554	-	-	35	13,390	5	1,421	211	92,027
CERCOM	14	2,187	71	7,794	12	980	21	3,033	20	3,575	1	91	-	-	-	-	59	9,045	198	26,705
MICOM	6	478	98	10,027	1	108	34	3,409	5	801	44	5,592	1	99	2	1,948	9	946	200	23,408
TARCOM	20	2,538	82	19,185	9	2,294	54	7,735	5	1,332	5	485	2	501	-	-	23	4,581	200	38,651
TSARCOM	10	2,311	45	15,345	2	310	67	27,710	7	1,323	40	17,136	4	878	-	-	25	4,072	200	69,085

Item selection was determined from the 31 March DoD Instruction 4140.24 Stratification tables. All items having on hand Economic and/or Contingency Retention assets were rank ordered in descending dollar value sequence. All Army ICP's except the Troop Support and Aviation Materiel Command were instructed to analyze the first 200 items on the list. The Troop Support and Aviation Command was instructed to analyze the top 100 Aviation items and the top 100 Troop Support items.

GROUP A - Represents items with assets currently stratified as long supply materiel acquired through the provisioning process.

GROUP B - Represents items which are being phased-out of the supply system.

GROUP C - Understated Requirements - Represents items which are not true long supply.
Decreased Requirements - Represents items in long supply due to decreased requirements primarily from the Viet Nam era and reduced maintenance factors.
Overstated Requirements - Represents items in long supply for which subsequent review indicated that the requirements were overstated at time assets were acquired.
Life of Type Buy-Out - Represents items in long supply where the principal supplier was discontinuing manufacturing process and a quantity was procured to support the end item through its planned life.
Logistic Transfers - Represents items which were in a long supply position at time logistic responsibility was assumed or where items are in process of being logistically transferred.
Unit/System Deactivation - Represents items in long supply because of changes in Force Structure which either eliminates a specific unit or changes the equipment authorization of a given unit.

GROUP D - Other - Represents items in long supply the reason for which could not be determined from available records and time to develop analysis did not permit further research.

NAVY LONG SUPPLY SUMMARY
ITEMS: 406
$ VALUE: 4,537,000

OSD STUDY GROUP
SECONDARY ITEM STOCKAGE POLICY
REASONS FOR LONG SUPPLY

($ IN THOUSANDS)

	GROUP A Provision Item		GROUP B Phase Out		GROUP C Other		GROUP D Unknown		TOTAL	
	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.
ASO	22	459	72	457	72	1,280	40	660	206	2,856
SPCC	49	416	67	518	35	393	49	354	200	1,681
SUMMARY	71	875	139	975	107	1,673	89	1,014	406	4,537
% OF TOTAL	19%		21%		37%		23%			

AIR FORCE LONG SUPPLY SUMMARY
ITEMS: 800
$ VALUE: 37,512,000

OSD STUDY GROUP
SECONDARY ITEM STOCKAGE POLICY
REASONS FOR LONG SUPPLY

($ IN THOUSANDS)

	GROUP A		GROUP B		GROUP C										GROUP D			
	Provisioning		Phase-Out		Decreasing Demand Rate		Decreasing Depot Ovhl. Condemn.		Receipt Assets Recl./Modif.		Decrease FMS Case Levels		Multiple Responses		Other Responses		Other Unknown		Total	
	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.
SUMMARY	90	4,384	151	6,342	287	12,766	11	1,453	19	1,763	9	310	84	4,834	92	3,931	57	1,729	800	37,512
San Antonio	21	889	35	1,540	64	3,388	1	83	5	136	5	242	18	1,808	29	1,595	22	795	200	10,476
Sacramento	46	1,932	43	1,427	77	2,900	0	0	3	1,054	3	59	17	680	6	248	5	330	200	8,630
Warner Robins	12	568	27	725	88	1,584	0	0	4	67	0	0	18	368	26	318	25	136	200	3,766
Oklahoma City	11	995	46	2,650	58	4,894	10	1,370	7	506	1	9	31	1,978	31	1,770	5	468	200	14,640

Data not available from Ogden Air Logistics Center.

GROUP A - Items provisioned at rates exceeding actual rates ultimately experenced.

GROUP B - System phasing-out and/or declining program: Long period (24 months since last demand).

GROUP C - Decreasing actual demand rate.
Decreasing depot overhaul condemnation rate.
Receipts of assets from reclamation and modification,
Decreasing FMS Case Levels.
Multiple responses - two or more reasons identified as applicable.
Other responses - includes increased unit cost, causing decrease in segments within APAO (e.g., safety levels); reduction in NSO level; decrease in leadtime and other reasons.
Other unknown - Inapplicable responses and unknown reasons.

DLA LONG SUPPLY SUMMARY
ITEMS: 663
$ VALUE: 29,039,000

OSD STUDY GROUP
SECONDARY ITEM STOCKAGE POLICY
REASONS FOR LONG SUPPLY

($ IN THOUSANDS)

	GROUP A		GROUP B		GROUP C												GROUP D		Total	
	Provisioning		Phase-Out		War Reserve		Special Programs		Demand Never Developed		Demand Long Term Reduction		Demand Short Term Reduction		Demand Repetitive But Infreq.		Other			
	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.	No.	$Val.
SUMMARY	6	147	36	1,305	33	684	13	676	42	747	241	5,448	107	6,525	88	11,303	97	2,204	663	29,039
Construction	-	-	8	167	12	211	4	347	8	191	72	1,733	34	882	20	439	42	1,569	200	5,539
General	-	-	7	176	16	168	1	20	13	263	123	1,236	18	182	16	1,095	6	248	200	3,388
Industrial	6	147	18	699	5	305	8	309	21	293	36	277	29	720	28	620	49	387	200	3,757
Electronics	-	-	3	263	-	-	-	-	-	-	10	2,202	26	4,741	24	9,149	-	-	63	16,355

GROUP A - Represents items with assets currently stratified as long supply and materiel acquired through the Provisioning process during a past time period.

GROUP B - Represents items which are being phased-out through some technical or catalog decision. Assets to be issued until exhausted.

GROUP C - War Reserve - Represents long supply resulting from changes in War Reserve Requirements.

Special Programs - Represents long supply resulting from extraordinary supply management actions to assure total supply support for Military Service priority programs; e.g., modernizations, overhaul, weapon support.

Demand - Never Developed - Represents long supply on items which never experienced demand since assuming management.

Demand - Long Term - Represents long supply on items with a gradual erosion of demand over a 2-year period or longer.

Demand - Short Term - Represents long supply on items with a significant change in demand rate occurring within a 2-year period.

Demand - Infrequent - Represents long supply on items with repetitive demand but occurring very infrequently. Long supply a function of demand variability.

GROUP D - Other - Represents both miscellaneous reasons and items reviewed where reasons could not be determined.

4.0 CURRENT WEAPON SYSTEMS MANAGEMENT

CURRENT WEAPON SYSTEMS MANAGEMENT - ARMY

Identification Process of Items Related to Weapon Systems

The Army utilizes a five position Financial Inventory Accounting (FIA) code assigned to each National Stock Number (NSN). The fourth and fifth position of this code identifies the Weapon System or Weapon System family that each NSN is assigned. When an item is introduced to the supply system an FIA code is a mandatory element that must be assigned to create a record for that item. Once assigned, the fourth and fifth positions of the FIA code generally do not change. The primary exception is when an item is used by more than one weapon system and a system other than the one coded in the fourth and fifth position of the FIA code becomes the principle user of the item; the code could be changed to reflect the new weapon system.

In addition to the fourth and fifth position of the FIA file, each NSN recorded is coded to reflect all applications for the item. This capability not only identifies other weapon systems that the item is used on but also identifies the peculiar application by make/model. (e.g., the fourth and fifth position of the FIA code may indicate the UH-1 helicopter while the End Article Application (EAA) file may identify the UH-1 H model only.) This code will also identify specific equipments within a family grouping. (e.g., the fourth and fifth position of the FIA code may identify FM radios while the EAA file will identify an application to the AN/PRC-77 radio.)

Organizational Structure

At all Army Inventory Control Points (ICP), the primary functional directorates (Material Management, Logistics Engineering, Maintenance Engineering and Procurement) are organized by weapon system or homogeneous family grouping of systems. A primary feature of systems management within the Army is the vertical team concept that cuts across the formal functional structure. This concept is displayed in the attached matrix which shows the vertical relationship for the U.S. Army Missile Command.

Program Development and Execution

Provisioning: Separate programs are developed for each system in the provisioning process. These programs are tracked from inception through execution by weapon system.

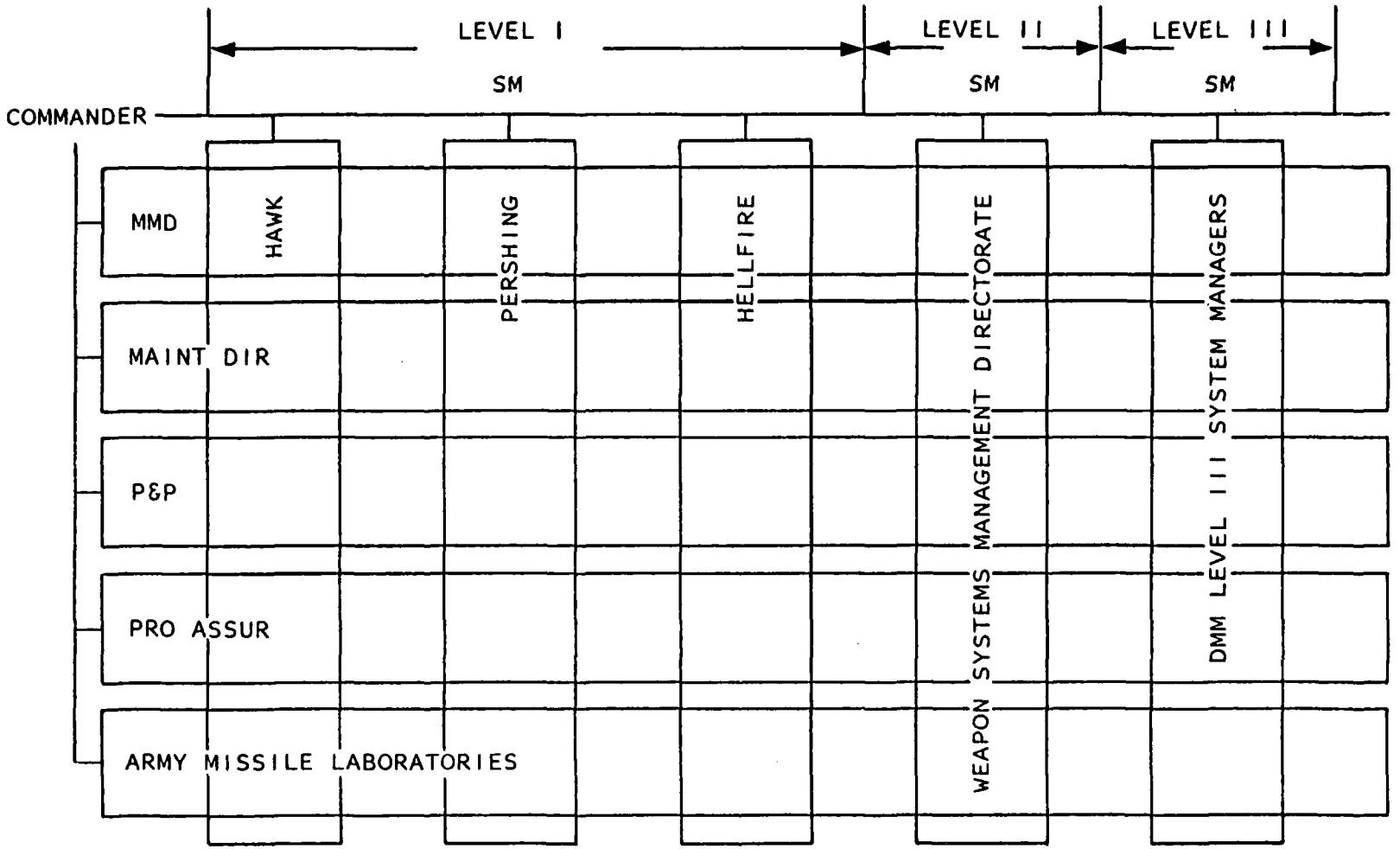
Replenishment: Although procurement spares and stock fund replenishment programs are approved at a total program level, the execution is monitored on a weapon system basis at the ICP. This is accomplished by allocating funds received (obligational authority) by weapons system based on the deficits reflected in 4140.24 stratification tables summarized by the weapon system codes in the FIA code. The distribution and utilization of funds are controlled/monitored by a programs control office within the Directorate for Material Management.

Management Initiatives

Quarterly reviews are held at the Inventory Control Point Directorate and/or Command Level. These reviews are structured in such a manner as to bring out any problem in the weapon system or in the support posture thereto. Based on findings in these reviews, workloads are prioritized to eliminate or smooth out the troublesome areas within a weapon system.

Reporting Effectiveness Goals

Through the MILSTEP reporting system, up to 33 key weapon systems are tracked for logistic support availability at each ICP.


LEVEL I
LEVEL II
LEVEL III
SM
SM
SM
COMMANDER
MMD
MAINT DIR
P&P
PRO ASSUR
ARMY MISSILE LABORATORIES
HAWK
PERSHING
HELLFIRE
WEAPON SYSTEMS MANAGEMENT DIRECTORATE
DMM LEVEL III SYSTEM MANAGERS

CURRENT WEAPON SYSTEMS MANAGEMENT - NAVY
(ASO)

Identification Process of Items Related to Weapon Systems

Application Data

The principal inventory control file is the MDF, whose records are keyed by National Item Identification Number (NIIN). The MDF contains complete application and the percentage of the application that contains the NIIN. A record is established for each application (next higher assembly) on which the NIIN is used. For purpose of application data an engine is considered a Weapon.

The Weapon System File (WSF) contains the same application data as the MDF, but the key to the WSF is application and a two character sub code known as the Application Identification Number Activity Code (AINAC).

Special Management Identification Code (SMIC)

The majority of the Aviation stock fund and investment items, (1R and 2R Cog), the bulk of the items under ASO's cognizance, are identified by a 2 character Special Management Identification Code (SMIC). If an item is first established as peculiar to a single Weapon System, the SMIC identifies the item to the Weapon System (e.g., SMIC MF applies to F4 aircraft). If an additional application is later added, the SMIC is not normally changed. However, items which are applicable to a common commodity are so identified (e.g., SMIC SX applies to common safety and survival equipment). A SMIC may also indicate application to a system which is common to several aircraft (e.g., SMIC SZ applies to the ASN-92 Carrier Inertial Navigation System common to the E2C, S3, F14, and A6E aircraft).

Four Digit Cog Code

Two additional positions have been added to the cognizance code for internal management purposes. ASO has inserted the SMIC in these positions. This allows adjustment of safety level parameters by Weapon for budgeting and execution, as well as generation of various statistics for management monitoring.

Organizational Structure

The Weapons Logistic (WL) Division of ASO manages items peculiar to the latest aircraft or equipment (i.e. A7, F14, P3, S3, A6, E2C, AV8A, and VAST). WL is responsible for the life-cycle logistics management of the applicable weapons, beginning with the initial planning stages of weapon sub-system acquisition. The Stock Control Division (SC) manages older Weapon System (e.g., A4, F4, Helicopters) as well as Engines, Common Items and Support Equipment. While there is a separate Technical Division, technicians are co-located with WL and SC item managers under a matrix management concept.

The Aviation Supply Control Center (ASCC), under the direction of the ASO executive Officer monitors and expedites material causing an aircraft to be NMCS (Not Mission Capable-Supply) or PMCS (Partial Mission Capable-Supply) status. Critical test bench requirements identified as BROAD ARROW, are included in the ASCC monitoring and expediting program.

Program Development and Execution

Items are provisioned by Weapon System. Initial requirements are computed using a program base (i.e., flying hours and/or Depot Level Reworks). For investment items, with the exception of support equipment, the program base is retained throughout the life-cycle. The program base is retained for expense items, other than support equipment, for the Demand Development Period - normally two years.

Prior studies of expense items have revealed that using the same safety level parameters across all Weapons introduces bias against some Weapons, particularly first line aircraft. This phenomenon occurs because of the high prices of items peculiar to certain Weapons. Since FY-78, ASO has received additional NSF funds to enable weapon segmentation, thereby creating higher safety levels and removing the bias against later systems caused by higher prices paid for components of later systems. A POM-82 initiative has been submitted to obtain sufficient funding to achieve equivalent SMA for investment items.

Initial funds are internally allocated and tracked by Weapon System. Replenishment funds are internally allocated by Branch and tracked by major Weapon System within Branch. However, common items and support equipment cannot be associated with the Weapon System.

Management Initiatives

There is no workload prioritization by Weapon.

Reporting Effectiveness Goals

Supply Material Availability (SMA) is tracked by four digit cog code. Based on ASO's use of SMIC in the last two positions of the four digit cog, SMA is tracked for ASO cog items peculiar to Weapon Systems. Operational Readiness is tracked by Weapon System.

CURRENT WEAPON SYSTEMS MANAGEMENT - NAVY
(SPCC)

Identification Process of Items Related to Weapon Systems

At the time of provisioning, items are assigned to a Local Routing Code (LRC). The LRC is a three digit code which identifies the weapon system the item is used on and the item manager at SPCC. Items are assigned to the first major weapon system provisioned. Hence items with multiple applications will be assigned only to the LRC associated with the first weapon system. LRCs are changed only by special management actions. Normally, LRCs are not changed. The weapon systems file also contains all applications for a given stock number.

Organizational Structure

SPCC is organized for weapon system support. The provisioning section (Code 500) has both platform and program managers. The platform manager exists only during the initial phase-in of a weapon system. This person acts as SPCC's single point of contact to outside commands to coordinate logistical support for a weapon system. A program manager is responsible for the life cycle support of a weapon system. This includes provisioning for each echelon of support and coordinating modifications, replenishment spares regardless of managing ICP, and managing the weapon system until it is phased out.

The replenishment section (Code 300) is divided into three major groups which correspond to the Hardware Systems Command which sponsors the parent equipments and provides funding. The LRC breakdown within these groups provide weapon system visibility.

Special vertical organizations are provided to unique weapon systems. These are for nuclear reactor material, Strategic Systems Support Office (FBM) material, and the TRIDENT submarine.

Program Development and Execution

Items are provisioned by weapon system. Weapon systems undergoing significant population increases are reforecasted (delta population). The replenishment process is accomplished by receiving funds by cognizance symbol and executed without regard to weapon system. The exceptions are for nuclear reactors, SSPO, and TRIDENT material.

Management Initiatives

No workload prioritization is accomplished using a weapon systems approach. Weapon system stratifications, a special program to track procurement execution by weapon system, and manual tracking of repair fund execution have been undertaken.

Reporting Effectiveness Goals

SPCC has developed a unique automated LRC Effectiveness Report. This report is produced monthly and allows SPCC to track supply material availability (SMA) for all LRCs (weapon system). The SMA for twenty designated weapon system are reported to NAVSUP on a quarterly basis. Monthly SMA statistics are tracked internally at SPCC for twenty-three weapon systems. These weapon systems figures are distorted by the commonality of items to other weapon systems, however the capability does not exist to distribute demands for a given item to the various weapon systems it supports.

CURRENT WEAPON SYSTEM MANAGEMENT-AIR FORCE

Identification Process of Items Related to Weapon Systems

During initial provisioning, items are coded in three ways to indicate the system application. One code is called the Supply Management Code (SMC) that is used in summarizing stratification data. Another code is the Materiel Management Aggregation Code (MMAC). This code is part of the National Stock number and is used to bring together under one manager those functionally related items which AFLC determines should be managed together. The third coding procedure is through the application data. Most items will show application data to weapon systems.

Items are assigned to either the System Manager ALC or the Federal Supply Class (FSC) Manager at an ALC. This decision is made during provisioning, based on the FSC. Certain FSC will automatically go to the SM; others will go to an IM. The SM is responsible for management of peculiar air frame type items, however, if the SM feels he should be managing other items, he may gain management responsibility through approval of HQ AFLC. The MMAC is used to assign SM responsibility and bring the management responsibility under one manager.

The SMC and MMAC codes can change as an item gains additional applications. Common items will have a 9999 SMC code and no MMAC code.

Organizational Structure

Pre-Provisioning: Air Force System Division has primary responsibility of the system during conceptual, validation, and full scale development phases of a weapon system. Here a program manager is assigned to manage the acquisition of the new system. Also, a Deputy Program Manager for Logistics (DPML) is assigned to handle the logistics support aspects of acquisition. Also, a System Manager Air Logistics Center is designated.

Provisioning: Individual item management assignments are made when the item is catalogued.

Production: Normally, after the first two years of production are completed, the DPML will become the System Manager at the Air Logistics Center (ALC). The System Manager is responsible for coordinating modifications and managing the weapon system until phase out.

At the ALC there are system management divisions and item management divisions. Normally the system management division will manage primarily peculiar air frame type items which are MMAC coded to him. Recoverable items and expense items are managed separately.

Within AFLC headquarters in Logistics operations, program managers are designated for major systems. Each manager monitors several systems. Usually, the term Program Manager (PM) will be used within AFSC and the term System Manager (SM) within AFLC, except when AFLC has specifically been assigned program management responsibility by the Program Management Directive (PMD); in that case the term Program Manager may properly be used within AFLC.

Program Development and Execution

Items are provisioned in support of a weapon system or end item program. Initially, all items requirements are estimated using program data. In replenishment, all investment items are program related, consequently, all investment items are weapon system oriented. Expense items use program ratios on an exception basis.

Initial funds are allocated and tracked by Weapon System. Replenishment funds are allocated to the ALCs; however, in many cases funds are designated for certain weapon systems. Procurement budget requirements are displayed by weapon system using SMC codes. Common items are shown as a special category and are not related to the particular weapon system. Repair projections for exchangeables are normally not displayed by weapon system. For Investment items, the execution

and spending applications of the allocation is at the discretion of the ALC. For Expense items, the SMC or weapon system is not used as these items are under the stock fund concept. The repair budget and execution does not consider weapon systems.

Management Initiatives

The Logistics Support Priority (LSP) which shows the relative priority of the Weapon System, is reflected in the first position of the Mission Item Essentiality Code (MIEC). The MIEC is forwarded to the maintenance repair organization along with the repair requirement. The MIEC is used by the maintenance repair organization to determine which repair requirement is worked first or the sequence of repair attention to be given.

For Investment items, the Buy Support Objective (BSO) or shortage cost keys used in the variable safety level computation are selected by weapon system. The BSO is a key that is used to project a 92% fill rate. The BSO represents the support goal established for each individual SMC.

A Requirements Data Bank System is being designed for the late 80's to provide managers information for planning, programming, and budgeting decisions and for controlling Air Force Logistics resources. The system will employ operations research models to define and evaluate logistics resource needs by Air Force by weapon systems, to allocate resources by weapon system considering priority and mission essentiality, and to measure the effect of logistics resource decisions on weapon system war Readiness Capability. This system covers both expense and investment items.

Reporting Effectiveness Goals

AFLC is working to get backorder and fill rate data by weapon system. We currently receive not mission capable and partial mission capable rates by weapon system.

Excerpts from AFLCR 400-1 for clarification

The System Management (SM) or Item Management (IM) ALC is normally designated concurrently with the program office cadre to provide a single ALC management focal point to plan, integrate, track and control all internal ALC activities relating to the program.

System Management in AFLC arose from the need to integrate the various functional elements that pertain to a particular system in order to accomplish approved systems objectives. This management discipline cuts across functional lines and ensures continuous attention above the specialized interest of any functional organization. The SM is responsible for integrating all those functional elements which comprise Air Force Logistics and ensuring their application in achieving realistic support to the assigned system.

CURRENT WEAPON SYSTEMS MANAGEMENT - DLA

Identification Process of Items Related to Weapon System

Weapon System management is exercised during the provisioning process and during the initial equipment production, distribution and early support period through identification of applicable DLA managed items (both new and established items) from the provisioning data. Provisioning files, off-line, provide this initial identification of item to weapon system although it is not subsequently file-maintained as an application file in either direction.

Additionally, the Military Services nominate individual weapon systems considered of major mission importance and identify individual DLA managed items critical to the operational support of each of 82 selected systems. These Service-selected items then aggregate to the approximately 190,000 different DLA-managed items which are categorized by DLA as Weapon System Support Program (WSSP) items. Although off-line files are maintained by individual weapon system, DLA manages all of these identically as WSSP items. Each is so identified in the Supply Control Record, and on individual Supply Control Study forms and purchase requests.

Individual items are identified to weapon systems on a regular basis in the context of individual support problems by individual customers, and by Service major commands as an element of problem item reviews (USAFE, SAC, TAC, and Service Weapon System managers, etc.). These latter groups of items are normally identified as causing problems of a recurrent nature for joint corrective effort (augmentation of requirement forecasts, addition to WSSP lists, selection for war reserve requirements, addition to activity authorized stockage lists, in addition to the temporary relief obtainable from expedited stock deliveries).

Organizational Structure

Each Defense Supply Center has assigned Supply, Technical and Procurement focal points to monitor the Weapon System Support Program

and procedures within that functional element. DLA HQ has an assigned program manager. Other functional organizations (within Supply, Procurement, Technical and Comptroller) are aware of and responsive to the need for special management attention to items in this program.

Each Defense Supply Center has an Emergency Supply Operations Center, operated to relieve customer supply crises. Item managers are separately aware of their WSSP items for special attention. The Management Support Office within the Supply Directorate of each DSC provides special attention to problem item reviews and analyses, provides focal point management for individual weapon systems requiring specialized attention.

One functional office within DLA HQ maintains focal point responsibility for any weapon system requiring unusual attention and provides HQ surveillance, over problem item reviews as well as individual item crises.

DLA has Customer Supply Assistance representatives who regularly visit requisitioning customers and logistics activities. They include selected weapon system managers in their regular schedules and are available as needed.

DLA is basically organized along commodity and functional lines, with management attention primarily concentrated on the basis of frequency or dollar value of demand, general performance indicators, high priority backorders, etc., rather than on support of a particular weapons system except during the initial provisioning and post provisioning period for a major weapon system or when extraordinary support problems are being encountered (such as for the B-52).

Program Development and Execution

Other than in the provisioning process, programs are not executed by weapon system.

Management Initiatives

There is no workload prioritization by weapon system. However, during periods of funding austerity or when blanket cuts are imposed, every effort is made to bias funding restrictions to avoid reducing support to provisioning or WSSP items.

As a matter of policy, greater attention is given to WSSP items by item managers, buyers and technical experts, everything else being equal. As a matter of practice, this policy is observed whenever possible and WSSP related actions are so identified for special handling.

DLA relies on the Military Service weapon system manager for advice of unusual supply requirements or extraordinary support problems being encountered for DLA managed items just as is done within the Services for common Service managed items where they cross installation boundaries or organizational lines. DLA-Service procedures are available to major commands and system managers to permit DLA support to unusual Service program requirements and to facilitate regular assessment of DLA support for any weapon system, totally or selectively (particular components such as the F-100 engine, selected items such as COSAL, AVCAL, ISSL, ASL, etc., or particular problem items).

An early DLA objective is to have interfacing Service-DLA procedures overlayed into internal Service procedures and system to facilitate their use by Weapon System program managers to overcome the present obstacle of their having to work around automated processes off-line. This should be accompanied by institutionalizing as doctrine the need for close and early coordination between weapon system managers and DLA during planning phases, as well as during regular operational support analyses.

Reporting Effectiveness Goals

Performance goals and statistics are not presently separately established or collected for weapon systems. It is planned to obtain separate sta-

tistics on supply performance for WSSP items, although not by weapon systems since requisitions cannot presently be identified to a particular weapon system.

5.0 The Concept of Weapon Systems Management For Secondary Items

The Concept of Weapon Systems Management for Secondary Items

I. Introduction

The concept of weapon systems management, as it applies to the supply management of spares and repair parts, has been discussed for several years. However, these discussions normally lack specific detail and result in few decisions because the term "weapon systems management" is ill defined. The meaning of weapons systems management varies for many individuals depending upon their perspective. This paper will attempt to establish a baseline for the description of a comprehensive weapon systems management concept to facilitate future discussions, analysis, and development of DoD policy. In order to accomplish this objective, the paper will: provide a detailed description of the various components of a comprehensive weapon systems management concept; document current supply management systems that are based on some form of weapon systems relationships; and identify shortfalls (current systems versus comprehensive concept) for future analysis, discussion, and policy development. It is critical to understand that this paper does not provide specific recommendations for the implementation of any weapon systems management concept but rather, identifies specific areas that should be discussed and analyzed before DoD policy can be developed. Also this paper does not deal with other aspects of weapon systems management such as manpower, reliability, maintenance plans, support equipment and total operating costs.

II. The Need

Before attempting to establish a common baseline for future discussions, it appears useful to discuss the reasons for the perception that current supply management systems should be more closely related to a comprehensive weapon systems management concept. Beginning in the mid-70s, military readiness has received increasing attention from virtually every quarter: from the President, the Congress, the Office of the Secretary of Defense, the news media, and the public, in addition to

the Military Departments. The Fiscal Year 1978 Defense Authorization Act (Public Law 95-79) directed that:

> "The Secretary of Defense shall submit...quantifiable and measurable materiel readiness requirements for the Armed Forces (and the) readiness status of the Armed Forces...
>
> The budget submitted to Congress shall include data projecting the effect of appropriations requested for materiel readiness requirements."

This Congressional Act established the legal requirement to quantify readiness, report on its status, and project it into the future based on resources requested in the budget. This Act did not come as a complete surprise. For several years prior to this, the Office of the Secretary of Defense and the Military Departments had been grappling with the problem of improving the readiness of our combat forces. In fact, large portions of the Fiscal Year 1978 and 1979 budget requests were justified on the basis that they would improve our military readiness. These segments included the Navy's ship overhaul program, all Services' aircraft depot maintenance programs, central supply operations programs, and the spares procurement programs.

In this environment, many segments of the supply management community began to seriously consider the relationship of the availability of spares and repair parts to weapon system materiel readiness. The analysis of this relationship was considered necessary because the accepted measurements of the supply system effectiveness, i.e., supply availability, average response time and backorders, do not lend themselves to any straight-forward relationship to weapon system readiness. If we are ever going to be successful in projecting readiness of specific weapon systems into the future and relating this readiness to applied resources, we must be able to quantify the impact of providing specific levels of one of these resources, spare and repair parts support on

specific weapon systems readiness rates. It should be understood, however, that this quantification is largely dependent on many other variables including: maintenance strategies, availability of trained maintenance technicians, equipment design and inherent reliability that also impact overall weapon systems readiness rates. Additionally, our ability to quantify the impact of these other variables is a formidable constraint on the achievement of overall weapon systems management.

III. Weapon System Definition/Description

The difficulty of defining the exact nature of a weapon system has sometimes been used as an excuse for not pursuing any further analysis of weapon systems management. The age old question of "is a ship, a soldier or a rifle, a weapon system" is really immaterial to this paper. Although the question would be important in any implementation of a weapon systems management concept, it does not need to be answered before a DoD policy concerning weapon systems management is developed. Each Service would be free, within some general guidelines, to decide which systems or subsystems would be managed as a weapon system. For the sake of conceptualization, this paper will assume that a weapon system is a major end item with some significant density (e.g., XM-1 tank, DD963 class ship, F-15 aircraft) or an important subsystem of an end item (e.g., XM-1 fire control system, MK-86 gun fire control system, F-100 engine for the F-15/F-16, etc.). It is important to understand that even under a comprehensive weapon systems management concept, all items in the supply inventory would probably not be managed under this concept. Weapon systems management would probably be applied only to unique items applicable to selected major systems and subsystems.

IV. The Concept of Weapon Systems Management

The major difficulty arising in any discussion of weapon systems management has always been the definition of the term. The term weapon systems management has different meanings for various people and

sometimes a single person perceives it as different things depending on the perspective from which it is viewed. The real problem appears to be that weapon systems management is not a single concept or a definite system. In its simplest terms, weapon systems management is a management concept applied to an item or group of items because of its/their application to a single or multiple weapon system. Weapon systems management has many components and is comprised of various subsets depending on the degree of management attention that one desires to focus on a given weapon system or group of weapon systems. This idea can be most easily understood if we attempt to view a comprehensive weapon systems management concept as a broad spectrum with many subsets of actions, each of which could be called an element of weapon systems management. The table below attempts to depict in a general manner the various aspects of a comprehensive weapon systems management concept.

SPECTRUM OF WEAPON SYSTEMS MANAGEMENT

Item Identification	Organization	Resource Allocation	Resources to Readiness Relationship
1. Application Files	1. Project Management	1. Analytical Models	1. Peacetime Readiness
2. Weapon System Files	2. Weapon System Office	2. Repair and Procurement Prioritization	2. Wartime Sortie Generation
	3. Inventory Control Point	3. Budget Submission and execution	

Management Actions	Information Systems	Requirements Determination
1. Workload Prioritization	1. Reports	1. Weapon System Segmentation
2. Intensive Management	2. Effectiveness Goals	2. Safety Levels Computation
	3. Demand Data	3. Optimization Models
		4. Sparing to Weapon System Availability

A comprehensive weapon systems management concept would incorporate many, but not necessarily all, of the above elements for selected items. A critical component of any weapon systems management concept is the determination of the essentiality of specific items. It is not enough to know that an item is used on a specific weapon system but it also is necessary to determine how critical the item is to the full operation of a weapon system. The concept of item essentiality is not depicted above; a separate paper is being written on this subject.

Additionally, the above table raises many questions concerning the responsibilities of various segments of the organization, i.e., responsibilities of the project manager, the weapon system manager, and the item manager. This paper does not attempt to make any recommendations to resolve this problem area. The entire area of organizational responsibilities requires further analysis and discussion before any policies can be developed.

The various elements of a comprehensive weapon systems management concept need to be discussed in more detail in order to fully understand the breadth of the various subsets of actions.

Item Identification: This topic discusses the ability to identify a specific item to all the weapon systems on which it is used.

> Application Files: In order to have a minimal degree of weapon systems management, the operating data processing system must have the ability to identify the application of a specific item to a weapon system or variety of weapon systems. This capability must be "on-line", i.e., the application data must be a part of the master record or other file that is accessible during normal computer processing. If "on-line" application data is not available, it is difficult to mechanically treat a specific item in a predetermined manner because of their use on a designated weapon system. There are methods of working around this problem but they are generally diffi-

cult, cumbersome and inefficient. Thus, the "on-line" capability to identify an item to the weapon systems on which it is used, is an essential element of any weapon systems management concept. However, it should be noted that items common to more than one weapon system present serious problems when attempting to focus management attention on a specific weapon system. These problems can be eased by concentrating only on items unique to a single application or by the development as an allocation methodology for items used on several weapon systems, i.e., common items. It should be noted, however, that any allocation methodology necessarily introduces the element of subjectivity into weapon systems management.

Weapon System Files: An enhancement of application files discussed above, is the capability to, identify in an automated system, all the parts, components and sub-components used on a specific weapon system. A weapon system file can be very useful in applying program data to specific items, setting retail allowances, and many other supply management functions. The development of such files may require substantial resources.

Management Actions: There are a series of actions that management can take to improve the support of an item or group of items because they are used on a selected weapon system or group of weapon systems. This section includes only management actions as opposed to actions that increase stockage levels (stockage levels are discussed separately under the Requirements Determination section).

Workload Prioritization and Assignment: One type of management action that can be taken is the prioritization of workload at stock points or inventory control points. An example of this type of action is the special handling of items applicable to selected weapon systems during the procurement process or

during the issue and shipment process. Within a given issue priority of the current UMMIPS, management has the ability to give selected items "special handling".

Intensive Management: Another form of management action that can be taken is the inventory management review of items based on their unique application to a specific weapon system. Under this concept, items would be reviewed more frequently independent of demand and frequency considerations. Our current operational techniques do a variety of things to focus management attention on fast moving items. This concept could be applied to other essential items based on their use in selected high priority weapon systems.

Organization: An important factor in any weapon systems management concept is the organizational design of an activity. This design can provide emphasis on a weapon system basis or totally ignore weapon system relationships. The area of organizational responsibilities surfaces many conflicts between the weapon system manager and the item manager. This area requires further analysis and discusssion before any concrete recommendations could be made.

Project Management: The matrix organizational structure, better known as project management, is an excellent tool for focusing management attention on selected major weapon systems within an activity. Under this concept, a project manager is assigned to a weapon system at an inventory control point and is responsible for the overall "health" of that system for a selected period of time. He has the authority to cut across functional lines, e.g., procurement, stock control, provisioning, etc., to ensure that adequate levels of support are provided to the specific system.

Weapon System Office: This concept takes the matrix management a step further and establishes an organization that has

authority across the lines of several independent activities. The Weapon Systems Office would be responsible for logistics support provided by many activities to that system.

Inventory Control Point: Several options are available for the organization of inventory managers that can focus management attention on specific weapon systems. One possible organizational option is the assignment of items for inventory management by weapon system, i.e., a group of item managers would manage all items unique to a specific weapon system. The use of this or other similar options would concentrate management attention on selected weapon systems. This type of organization could also be applied to other functional areas including procurement and technical support. However, this option must also consider the requirement to maintain a commodity oriented management structure.

Information Systems: A major ingredient of any weapon systems management concept is the development and use of information systems to present data, assess support posture, and aid decision-making.

Reports: This general category of information systems would develop reports by weapon system to collect costs, monitor performance and isolate areas requiring additional attention. Further development of this area is required to identify meaningful reports that could be developed and used on a weapon systems basis.

Supply Performance: As discussed earlier in the paper, supply performance as measured by supply availability, backorders or response time is very difficult to relate to weapon systems readiness. The development of a capability to collect supply system performance data by selected weapon systems would enhance any weapon systems management concept. This data could be used in conjunction with weapon system

readiness projections in the Materiel Readiness Report forwarded to Congress. An analysis of supply performance by weapon system as related to actual weapon system readiness, over a period of time, may be the first step in the longer range attempt to establish a quantifiable relationship between these two variables. Collection of supply performance by weapon system for items that are unique to one specific weapon system would not be too difficult. However, collection of this data for items used on more than one system will be difficult (incoming demand is not identified by weapon system in MILSTRIP) and would probably require an allocation methodology to segregate demand by weapon system or a decision to concentrate only on those items unique to a single weapon system.

Demand Data: A comprehensive weapon systems management concept would require that all demands be related to the "requesting weapon system" and that supply performance (as discussed above) be computed for each weapon system. If the capability to collect this data were developed, serious analysis could then be conducted in an effort to quantify the impact of spares availability on overall weapon system readiness. This analysis is essential if the problem of relating resources to readiness is to be solved within the context of the current inventory management operating systems (i.e., systems used for requirements computations and execution).

Resource Allocation: The previous description of the various segments of a weapon systems management concept have focused on actions and data collection that do not directly influence the computation of requirements or the allocation of resources during execution. The balance of the description of various sub-sets of a weapon systems management concept will focus on concepts that directly impact requirements computation techniques and subsequent execution.

Analytical Models: Analytical models that attempt to quantify the impact of selected levels of spares availability on weapon system operational readiness rates are extremely useful tools in the resource programming process. These models, though not part of the inventory management operational system, can be used in developing programs that are properly balanced and can help to quantify the projected readiness impact of various program alternatives. Properly developed, these models can also be used to project weapon system readiness rates based on budgeted resources for spares procurement and repair.

Budget Submission and Execution: The ability to submit budgets and track execution of spares procurement and depot repair programs by weapon system is an essential element of a comprehensive weapon systems management concept. This ability does insinuate that budgets should be submitted by weapon systems and then constrained during execution to the original submission. This capability simply provides for projecting requirements by weapon system and documenting actual obligations and expenditures by weapon system. The Services would still have freedom to change the allocation focused on weapon systems rather than general requirements and deficiencies.

Procurement and Repair Prioritization: Budgeting and execution by weapon systems could lead to prioritization by weapon system. The ability to segregate requirements and funding by weapon system is extremely useful in allocating deficiencies during execution or deciding between competing priorities in overhaul and repair. Deficiencies can be allocated and priorities established in view of likely impacts instead of a common "sharing of the hurt". This capability does not pre-judge the decision but does offer some options, i.e., the Service may decide to allocate deficiencies equally across all weapon systems.

Requirements Determination: The most critical component of any weapon systems management concept is the requirements determination process. There are several options within our current operating systems to treat groups of items in a different manner when establishing requirements.

Weapon System Segregation: This process can be used to vary the shortage costs by weapon system to compute safety levels to achieve the same supply availability goal for each major weapon system. The current safety level model buys more safety level for low-cost, fast-moving items and less safety level for high-cost, slower-moving items. The effect of this computation is that in general the low-cost, fast-moving items achieve a higher supply availability than the overall goal while the high priced, slower-moving items achieve a lower supply availability than the overall goal. If left unchecked, the model generally would achieve a lower availability for the high-cost new systems (these systems normally are composed of high-cost components) and a higher availability for the lower-cost older systems (these systems are normally composed of lower-cost components). Weapon segmentation enables the Components to set the same supply availability objectives for new systems as for older systems.

Safety Levels Computation: An extension of weapon system segmentation is the setting of shortage costs in the safety level computation to achieve higher supply availabilities for selected weapon systems. Implementation of this concept would require the components to prioritize weapon systems or at least designate some systems on which a higher supply availability is desired.

Optimization Models: Current requirements computation systems for replenishment spares use models that optimize either supply availability or time weighted backorders short. In the long term, models could be developed to compute requirements

that would optimize weapon system operational readiness rates. The analysis required to relate spares availability to some form of weapon system availability rates is extremely difficult but significant progress toward solving these problems has been made in recent years. The implementation of this type of model would require significant changes to current computer software programs and probably isn't feasible in the short-term.

Sparing to Weapon System Availability: This term has been applied to initial spares models that compute requirements that are based on weapon system operational readiness rates to be achieved rather than the conventional models that are based on supply availability goals. Use of these models requires particular attention to ensure that technical estimates used as inputs are carefully reviewed to prevent excessive initial spares requirements. This concept should not be used alone in an attempt to achieve high operational availability rates, but rather should be used in conjunction with an aggressive program to design high reliability into new weapons systems.

Resources to Readiness Relationships: A comprehensive weapon management system containing many of the subsets described above would attempt to use all the tools developed to link resource requirements with projected readiness of selected weapon systems.

Peacetime Readiness and Wartime Capability: Efforts to relocate spares procurement and repair funding to the availability of specific weapon systems operational readiness rates should consider both peacetime readiness and wartime capability. The ultimate objective is the linkage of spares availability to the peacetime readiness and wartime capability of our major weapon systems.

V. Current Weapon Systems Management Action

The DoD Components are currently accomplishing many of the subsets of actions described in the spectrum of weapon systems management above. Although, no Component has a comprehensive weapon management system that quantifies the resources to readiness relationships, significant progress has been made in the past several years. The table below provides a general summary of each Component's weapon systems management capability in the format of the weapons management spectrum discussed earlier in this paper. Complete details of current systems and procedures summarized in the table are documented in Annex D.

Matrix of Component Participation

Item Identification	Organization	Resource Allocation	Resources to Readiness Relationship
1. A, AF, N	1. A, AF, N	1. A, N	1. Z
2. A, AF, N	2. A, AF, N	2. AF	2. AF
	3. A, AF, N	3. A, AF	

Management Actions	Information Systems	Requirements Determination
1. AF	1. A, AF, N	1. A, AF, N
2. Z	2. A, N	2. AF, N
	3. A	3. A, N
		4. A, N

Legend

A - Army N - Navy AF - Air Force Z - All

VI. Conclusions and Recommendations

The need for more extensive weapon systems management for spares or repair parts is required if we are going to continue our efforts to: improve the readiness of our combat forces; attempt to relate resources to readiness and project specific weapon systems readiness into the

future. This paper has described a broad spectrum of actions that comprise a comprehensive weapon systems management concept and has documented management systems used by each DoD Component that fall into this broad spectrum. From the data presented, it must be concluded that each Service employs some form of weapon systems management. The question that should be asked is not "whether we should implement a weapon systems management concept" but rather "how far into the spectrum of weapon systems management should we move and at what pace should we proceed". At each step of development, we must also consider resource implications.

The remaining portion of this paper will develop a series of short-term options for further consideration and discussion that would improve our current weapon systems management capabilities. These options are presented as possibilities for further analysis and an attempt to isolate areas that need further discussion and policy decisions. Future discussions concerning the movement to more weapon systems management should focus on these subject areas. Some of these options will be applicable to all DoD Components while others will be addressed to specific Components. Lastly, some long-range options will be proposed. Additionally, OSD should take some short-term action to facilitate the future progress of weapon systems management.

Short Range Options Applicable to All Components

OSD short-term actions:

- Task the DoD Components to conduct analysis in the area discussed below,
- Establish milestones for the completion of the required analysis,
- Create a forum to review the Components' analysis and recommendations and conduct discussions on future

actions required to implement selected subsets of the weapon systems management concept, and

- Develop DoD policy concerning weapon systems management.

Each Service should investigate the feasibility of displaying supply system performance measurements (supply availability, weighted backorders, response time) by major (selected) weapon system. DLA should investigate the feasibility of displaying separate measurements for those items that are part of the Weapon System Support Program.

Each Component should investigate the feasibility of incorporating these weapon system supply performance measurements in the Materiel Readiness Report. The Components should also review the possibility of projecting these measurements into the future to correspond with the weapon system operational readiness projections made in this report.

Each Service should investigate the feasibility of developing programs and budgets and tracking execution by major weapon system. These projections would not require the Services to execute the budget with any weapon system control numbers; there would be no change to flexibility that exists today.

All Components should conduct analysis and develop procedures (i.e., management actions) to intensify management for selected major weapon systems.

The Services should conduct analysis to determine feasibility and desirability of setting safety level shortage cost parameters to achieve higher supply availability for selected major weapon systems (the implementation of these actions would not necessarily be a short-range action).

The Services should develop the capability of passing weapon system application data to DLA and DLA should develop procedures to effective-

ly use the Service data.

Short-Range Options Applicable to Specific Components

Army

- Implement and fund the weapon system segmentation concept (described in Section III).
- Continue efforts in the area of "sparing to weapon system availability" (described in Section III).

Navy

- Fund remaining portions of weapon system segmentation at ASO and investigate the feasibility of implementing at SPCC.
- Continue efforts in the area of "sparing to weapon system availability" (described in Section III).

Air Force

- Continue efforts in modeling peacetime readiness and wartime sortie generations.
- Investigate the "sparing to weapon system availability concept".

DLA

- Conduct analysis to determine feasibility and desirability of developing weapon system application files.

Long-Range Options

Develop capability of segregating demand by weapon system.

Develop systems, procedures, and ranking to prioritize resource allocation by major weapon system.

Link spares support to peacetime readiness and initial combat capability.

Department of Defense

Establish objectives.

Cross fertilization.

Timing.

END